

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
لِبِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

اللَّهُمَّ إِنِّي أَعُوذُ بِكَ مِنْ أَنْ يَأْتِيَنِي
الشَّرُّ مِنْ يَدِي وَمِنْ خَلْفِي وَمِنْ يَمْسَأَلَنِي وَمِنْ



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
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TABLE ONE
ABBREVIATIONS FOR MANUSCRIPTS
MENTIONED IN THIS WORK¹⁾

Ali	= Ali Emiri Arabi Manuscript No. 2854, Istanbul, Turkey.
Asaf.	= Maqalat Asafiyya Library Ms., Hyderabad, Deccan, India.
Bank. 16	= Bankipore Public Library Ms. (No. 16), Khuda Baksh O.P. Library, Patna (Bihar), India.
Bank. 17	= Bankipore Public Library Ms. (No. 17), Patna (Bihar), India.
Bes. 502	= Beşir Ağa Ms. No. 502, Istanbul, Turkey.
Bes. 503	= Beşir Ağa Ms. No. 503, Istanbul, Turkey.
Bodl. Or. 491	= Bodleian Or. 491, Bodleian Library, Oxford, England.
Br. Mus.	= The British Museum Ms., Add. 19619, London, England.
Esc.	= Escorial Ms. Arabe No. 876, Escorial, Spain.
Got.	= Gotha Ms. (Arab. 1275; Stz. Kah. 969), Gotha, Germany.
Gran.	= Granada Ms. (no catalog number given), Granada, Spain.
Hunt.	= Huntington Ms., No. 156, Bodleian Library, Oxford, England.
Leid. 13	= Leiden Ms. God. or. 13(2), Leiden, Netherlands.
Leid. 2540	= Leiden Ms. God. or. 2540, Leiden, Netherlands.
Len.	= Leningrad Ms., No. D169, Leningrad, USSR.
Madr. 57	= Madrid Ms. Arabe No. Gg. 57, Madrid, Spain.
Madr. 5007	= Madrid Ms., No. 5007, Madrid, Spain.
Madr. 2008	= Madrid Ms. No. 2008-30, Madrid, Spain.
Mar.	= Marsh Ms. No. 54, Bodleian Library, Oxford, England.
Mar. 42	= Marsh Ms. No. 42, Bodleian Library, Oxford, England.
Mrk. 21	= Marrākush Ms. No. 21 at Al-Kalāwī Library, Marrākush, Morocco.
Mrk.	= Marrākush Ms. No. 404, housed at the library of Ibn Yūsuf's College, Marrākush, Morocco.
Par. 2953	= Paris Ms. Arabe No. 2953, Paris, France.
Par. 5772	= Paris Ms. Arabe No. 5772, Paris, France.
Par. 6208	= Paris Ms. No. 6208, Paris, France.
Par. 6461	= Paris Ms. Arabe No. 6461, Paris, France.
Par. 6824	= Paris Ms. No. 6824, Paris, France.
Rab. 635	= Rabāṭ Ms. No. D. 635, at the Public Library, Rabāṭ, Morocco.
Rab. 1427	= Rabāṭ Ms. No. D. 1427, at the Public Library, Rabāṭ, Morocco.
Seh.	= Şehit Ali Paşa No. 2020, Istanbul, Turkey.
Taym.	= Taymūr Tibb Ms. No. 137, at the National Library, Cairo, Egypt.
Top.	= Topkapi Sarayindaki Ms. No. 1990, Istanbul, Turkey.
Tub. 782	= Berlin Ms. or. quart. 782, housed at present in Tübingen, Germany.

¹⁾ For the names and addresses of the libraries where these manuscripts are housed, as well as for further information, see the Bibliography (Manuscripts).

PREFACE

The domain of the 'Abbāsid caliphs in the ninth century and the first half of the tenth gave a rich cultural yield. When we compare such an intellectual outburst with its counterpart in Arabic Spain, Cordova seems eclipsed by glittering Baghdād. Nevertheless, the second half of the tenth century marked Spain's golden age under the Umayyads. Peers to the scholars and writers in the East began to emerge on the cultural scene of this progressing state. At this time among the greatest medical figures of the Western caliphate (according to such historians as Leclerc, Baas, Meyerhof, Sarton, and Garrison) stands Abulcasis.

When we probe into the literature, however, the feeling cannot be escaped that everyone knows of Abulcasis without knowing much *about* him and his work. The twenty-eighth and thirtieth treatises (the pharmacochemical *Liber Servitoris*; and the surgical treatise) are of course well known and understood. In fact they were so renowned that they gradually obscured the place of the complete *al-Taṣrif* as one of the very earliest medical encyclopedias written in the Western caliphate and as a work concerned with medical therapy, *materia medica* and pharmacy at least as much as with either surgery or clinical medicine.

This circumstance, coupled with the relative neglect of the pharmacomedical history of the Western caliphate, turned us toward the task of gaining a new and better view of Abulcasis based upon the earliest available manuscripts of *al-Taṣrif*, together with other relevant sources, both primary and secondary. The world-wide search for the manuscripts, eventually filmed in twelve countries has brought together a unique collection that not only permits us to clarify or illuminate many points in the present study, but also gives the foundation for a line of investigation that I expect will yield a series of reports.

Here we attempt to show Abulcasis—hereafter referred to as al-Zahrāwi, his Arabic nickname, and not as Abulcasis, the Latinized form of the transliteration, Abū al-Qāsim—within the cultural and social context of his time, try to clarify what is known about

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his life, and to reveal the character of *al-Tasrif* as a whole and in particular, of the forgotten twenty-fifth treatise on the "adhān". The pharmaceutical viewpoint from which we examine these matters finds partial explanation in the pervasive pharmaceutical interests of al-Zahrāwī himself, and also in the training of both authors of this study as pharmacists before earning Doctor of Philosophy degrees (history of pharmacy and history of science) at the University of Wisconsin.

The basic work in this book before us formed my dissertation in June, 1959 (under the guidance of my collaborator). Thereafter, both of us have re-shaped it considerably for the present publication. As for me, having lived in the Near East until I was twenty-seven, graduating from the only university that teaches medical and pharmaceutical sciences in the Arabic language, the Syrian University (University of Damascus today), I must take responsibility for the translations and for any inaccuracies in them. In transliterating from Arabic I have followed the system adopted by the Library of Congress (Processing Department, Cataloging Service, Bulletin 49, November 1958, pp. 1-10). Significant technical terms and other transliterated words whose meaning may be unclear to many readers have been defined in Appendix 4 (Glossary).

Whatever its flaws or merits, this work could hardly have reached its present stage and form without the constant encouragement and active participation of my collaborator, the patience and assistance of my wife, and the research funds granted us by the Research Committee of the University of Wisconsin, as well as the partial support awarded me by the University of Wisconsin School of Pharmacy, especially from the Horlick Fund, and the generous aid of a subvention (NSF-G 23675) from the National Science Foundation, Washington, D.C.

Both authors wish to express their warm appreciation to Professor Marshall Clagett for reading the final draft of the manuscript and for his invaluable suggestions on various points throughout the text.

We also call particular attention to the generous cooperation we obtained from the libraries of the University of Wisconsin (Madison, Wisconsin) and the Smithsonian Institution (Washington, D.C.). Finally, we recognize with gratitude the essential services of many

libraries and librarians who helped to secure microfilms and untangle bibliographic puzzles, among whom the following at least should be mentioned:

Biblioteca Apostolica Vaticana, Italy; Biblioteca Nacional, Madrid, Spain, Bibliothèque Général, Rabat, Morocco (Chief Librarian, A. al-Rajrājī); Bibliothèque Nationale, Paris (Director of Manuscripts Department, Marie-Roberte Guignard); Bibliothèque Nationale al-Zāhiriyah, Damascus, Syria (Librarian A. Hāchem); Bodleian Library, Oxford (Mr. N. C. Sainsbury); British Museum, London (Mr. Martin Lings); The Library of Congress, Washington, D.C.; E. J. Brill, Leiden (Librarian R. Ritsema); Egyptian National Library, Cairo; Harvard University, Cambridge, Mass.; Institut Vostokovegenia, the Academy of Sciences of the U.S.S.R., Leningrad; Landesbibliothek, Gotha, Germany (Librarian, Dr. Pachnicke); the Rijksuniversiteit Library, Leiden; The L. C. MacKinney-Smith Fund Collection, Chapel Hill, N.C.; McGill University, Medical Library, Montreal; National Library of Medicine, Washington, D.C.; Österreichische Nationalbibliothek, Vienna; Real Biblioteca de San Lorenzo, El-Escorial, Spain; Suleymaniye Ümumi Kütüphanesi, Istanbul; Universitätsbibliothek Tübingen, Tübingen, Germany; and Yale University's Medical Historical Library, New Haven, Connecticut.

SAMI HAMARNEH

CHAPTER ONE

ARABIC CULTURE IN SPAIN TO THE TIME OF AL-ZAHRĀWĪ

CONQUEST AND CONSOLIDATION

Early in the eighth century Mūsā ibn Nusayr governed North Africa under the Umayyads of Damascus. Having completed the Islamic conquest of North Africa to the Atlantic, he looked with ambitious eyes across the strait toward the opposite northern shores, to the Iberian Peninsula. After careful consideration, Mūsā took a decisive step. His lieutenant general, Ṭāriq ibn Ziyād, launched the attack in 711 A.D., and together they completed the conquest by 714.

In the ensuing forty-four years and seven months (711-56 A.D.) under the caliphate of Damascus, Spain had no less than twenty governors, an average of less than two years and three months in office for each. Such instability tended to hamper intellectual development of the country. Moreover, the Berbers—who composed the largest part of the victorious army—and Christian Spaniards formed a majority in the population of "al-Andalus"¹). The Arabs, although the ruling class, remained a minority. Socially and politically, these unharmonized elements continued to threaten the country's peace and stability²).

The second dramatic phase of the history of Arabic Spain materialized with the surrender of Cordova, the capital, to 'Abd al-Rahmān I, a scion of the fallen and still persecuted Umayyad family in Syria.³)

¹) The occupied part of the Iberian Peninsula the Arabs continued to call "Al-Andalus" (andalus). For convenience however, we shall refer to it as Arabic Spain.

²) J. B. Trend, "Spain and Portugal," in Thomas Arnold, and Alfred Guillaume, *The Legacy of Islam* (3rd ed., Oxford, 1952), 5-8.

³) For details on "the weary wanderings of a Prince in disguise," ('Abd al-Rahmān I) and his victory, the reader is referred to Henry Coppee, *History of the Conquest of Spain by the Arab-Moors* (vol. 2, Boston, 1881), 78-117, 149-167.

During his reign (756-88 A.D.) 'Abd al-Rahmān I directed his energy toward the consolidation and restitution of the state. At his instigation the great bridge was built over the river "Wādi al-Kabir" (وادي الكبير)—known by the distorted Arabic name Quadalquivir. During his reign also the mosque of Cordova was erected. But he spared little time to encourage learning or to invite scholars to his court, as his counterpart in Baghdād did.¹⁾ Moreover, hostilities with the Eastern Caliphate continued to hamper cultural intercourse between the two domains.

An encouraging step was taken during the reign of his son (788-96 A.D.), the ruling prince „al-Amīr” Hishām I.²⁾ Hishām perhaps was the first in Arabic Spain to stimulate education, which later rulers fostered still more vigorously. We shall have occasion to refer to some of these Muslim monarchs repeatedly, for at their courts men of learning found homage, prestige and encouragement. They used the state treasury to sponsor education and scholarly investigation, giving impetus to developments in the arts and applied sciences. At their courts, "public schools," and religious centers, and in the various affairs of the state, we find physicians and theologians, mathematicians and astronomers, poets and philologists given good pay and prestige for their services.

In these circles then began a flowering of cultural activities in Arabic Spain. It gained a stronger impetus during the reign of 'Abd al-Rahmān II (822-52). Yet, when these achievements of the first half of the ninth century are compared with the cultural outburst that swept Iraq and the adjacent states under al-Ma'mūm and his immediate successors,³⁾ one realizes how much, thus far,

¹⁾ About this time in Baghdād (765 A.D.) Caliph al-Mansūr invited the famous physician, Jurjis ibn Bakhtishū' to be his court physician, and bestowed upon him generous gifts. He did the same for other scholars who flocked to Baghdād and contributed to its cultural development.

²⁾ For a useful, concise chronological table of the Umayyad dynasty in Cordova, the reader is referred to Angel González Palencia, *Historia de la España Musulmana* (Barcelona, 1925), 13, 33.

³⁾ Al-Ma'mūm instigated the establishment of "The House of Wisdom" (بيت الحكمة) in 830 A.D. at Baghdād for translating the writings of the ancients, mainly from Greek into Arabic, as well as for promoting cultural activities. In this center men of high intellectual reputation, such as Hunayn ibn Ishāq, his son Ishāq and his nephew Hubaysh, Isā ibn Yahyā, and Yahyā ibn Batriq were active.

Arabic Spain lagged behind. The caliber of scholars and translators from the Greek and other languages serving under the 'Abbāsids was not yet available in Spain.

But before long, trade, travel, immigration, and more progressive government in Spain furthered Arabic culture there. The return of many learned men to Spain after being trained in the East and the importation of a great number of books in the arts and sciences brought unprecedented advances in the land. Without these works and training Spain would have waited much longer to reach the cultural prestige that was shortly to be hers. Moreover, the intellectual revival of Western Europe during the twelfth and thirteenth centuries might have been seriously affected.

CULTURAL DEVELOPMENT IN THE LATE NINTH CENTURY

One of the pioneering scholars of Arabic Spain, the learned Baqī ibn Makhlad, plays an important role during the second half of the ninth century. He had emigrated from Cordova to the Eastern Caliphate in pursuit of knowledge ¹⁾, and after his return to Cordova, theologians there accused him of heresy. The firm stand of the ruling prince, Muḥammad I (reigned 852-86 A.D.), in support of Ibn Makhlad ²⁾ marked a victory for advancing culture.

At this time Yūnis ibn Ahmad al-Harrānī also returned to his native country, Spain. He had been on a similar trip to the Eastern Caliphate for better training in the health field. The services of this physician at Cordova proved significant for the development of Arabic medical practice. Of further interest, from a pharmaceutical point of view, is the medicated confection [i.e., "ma'jūn" (مسجون)] of a secret formula that he devised and used in the treatment of his patients. It was sold in great quantity ³⁾ in much the same way as secret remedies of the past century.

¹⁾ About the middle of the ninth century and thereafter, many learned men went from Spain to the Eastern Caliphate to gain more knowledge and experience. Upon their return, they helped enrich cultural activities in their native land.

²⁾ Ibn 'Idhārī al-Marrākushī, *Al-Bayān al-Mughrib fī Akhbār al-Andalus wa al-Maghrib*, G. S. Collin, and E. Lévi-Provencal, eds. (vol. 2, Leiden, 1951), 109-110.

³⁾ 'Alī ibn Yūsuf al-Qiftī, *Akhbār al-'Ulamā bi Akhbār al-Hukamā* (Cairo, 1326 A.H. [1908 A.D.]), 258-9.

Al-Harrānī's contemporary, Jawād al-Masīḥī, also introduced a special "branded medicine" that became known as the Monk's Remedy, "Dawā al-Rāhib" (دَوْهَ الرَّاهِب). He also devised several pharmaceutical compounds that were named after him: Jawād's Lohoch, Syrup, Powder, et cetera.¹⁾ These secret proprietary preparations of al-Harrānī and Jawād seem to be the earliest of the kind known to have been sold in Arabic Spain.

Our study of the available literature pertaining to the health field in ninth-century Spain reveals no mention of independent pharmacy. Whenever pharmaceutical work is required we see the work done by, or under the supervision of, men who were first of all medical practitioners. They prepared medications for their own use in the various pharmaceutical forms.²⁾ There apparently was influence from the Eastern Caliphate, where—in spite of the separation of pharmacy from medicine—even eminent physicians still carried on the tradition of preparing the various medications for their patients. Nevertheless, professional pharmacists in public and hospital pharmacies, who already were flourishing in the East,³⁾ did not yet have a counterpart in the Iberian Peninsula as far as we know from evidence at hand.

SPAIN IN THE TENTH CENTURY

In the year 912, the eighth of the Umayyad monarchs in Spain, 'Abd al-Rahmān III, came to the throne, bringing more progress

¹⁾ Ahmad ibn al-Qāsim Ibn Abi Usaybi'ah, *'Uyūn al-Anbā fi Tabaqāt al-Āfiyyā* (vol. 2, Cairo, 1882), 41.

²⁾ Ibid., 41-2.

³⁾ A mention of public pharmacies was reported during the reign of al-Mahdi in Baghdad (775-85 A.D.). Supposedly the first person to be called a pharmacist, i.e., "al-Šaydalānī" (الشيدلاني), was Abū Quraysh 'Isā al-Šaydalānī, but he was not an educated practitioner and reportedly lacked pharmaceutical skill (Qiftī, *Ahhbār*, 280-3). In the first half of the ninth century, however, educated and reliable pharmacists called "ṣayādilah" (صيادلة) obtained licenses authorizing them to practice the profession in the large military camp near the capital. This authorization to practice the profession came from the major general of the army with the approval of the caliph. (Usaybi'ah, *'Uyūn al-Anbā*, 1: 109-113). For a further detail see Sami Hamarneh, "The Rise of Professional Pharmacy in Islam," *Medical History*, 6 (1962), pp. 59-66.

than at any time in the past. By 929 A.D. 'Abd al-Rahmān, as a rival to the incompetent caliph of Baghdād, proclaimed himself the caliph of Islam, the prince of the believers (أمير المؤمنين), and took the title „al-Nāṣir“ (الناصر).¹⁾ From that time until the fall of the Umayyads about a century later the rulers of Arabic Spain represent the Western Caliphate and are distinguished from the rulers of the Eastern Caliphate in Baghdād.

Arabic Spain reached the zenith of its glory during the reign of al-Nāṣir (912-61) and his son and successor, al-Hakam II al-Mustanṣir (reigned 961-76). Great advances were made in the various avenues of human endeavor: agriculture and horticulture, trade and transportation, army and navy, and construction and industry.²⁾ The expenditure on construction alone equalled the whole budget for defense and was one third of the revenue of the state treasury.³⁾

An extensive program for beautifying the capital was undertaken.⁴⁾ This included bringing in, through aqueducts, potable water to supply a growing city with a population of one-half million and 113,000 houses, besides the palaces, government buildings, public baths, libraries, hotels and schools. The bridge that 'Abd al-Rahmān I built over the great river of Cordova was redesigned and enlarged. At the same time the great Mosque of Cordova ("Mosquée Cathédrale") was added to and magnificently embellished, to become a worthy rival to the holy shrines in Jerusalem and Mecca. Known today as the Cathedral of Cordova, it stands as a monument to the grandeur achieved in the tenth century.⁵⁾ Thus Cordova became the most civilized city in Europe,

¹⁾ Carl Brockelmann, *Geschichte der islamischen Völker und Staaten* (München, 1939), 169-71.

²⁾ For a reliable survey concerning progress in the utilization of mines, metal and non-metal substances, and the major producing centers in the Peninsula, the reader is referred to César E. Dubler, "Über das Wirtschaftsleben auf der iberischen Halbinsel vom XI zum XIII Jahrhundert; Beitrag zu den islamisch-christlichen Beziehungen" in *Romanica Helvetica*, 22 (1943), 12-21, 35-45, 49-66. ³⁾ Marrākushī, *al-Bayān*, 2: 229-32.

⁴⁾ For further details see Muhammad ibn 'Abd Allāh al-Himyārī, *al-Rawḍ al-Miqṣār fi Khabar al-Aqṣār*, extracted and edited by E. Lévi-Provençal (Leiden, 1938), 153-8.

⁵⁾ For further details the reader is referred to the interesting and reliable account by E. Lévi-Provençal, *L'Espagne Musulmane au Xème Siècle: Institutions et vie sociale* (Paris, 1932), 195-236.

the wonder and admiration of the world. In the Islamic Empire it ranked second only to Baghdād, and in Christendom next after Constantinople^{1).}

Al-Zahrā'.—One of the most remarkable facets of architectural elegance was displayed in the construction of the magnificent royal city of al-Zahrā', located five miles northwest of Cordova. The city included the Caliph's palace, surrounded by beautiful gardens, with special wings for the royal family, the court's affairs, the imperial library, and for noteworthy guests (دار الفضاف). Archeological excavations at the site have revealed the splendors of the city in the tenth century.²⁾ Al-Nāṣir laid the foundation stone in 936 A.D. in commemoration of Zahrā' (زهرا), his wife,³⁾ if we accept this romantic story as a historical fact.

Whatever the immediate motive, al-Nāṣir undoubtedly looked with anticipation to a royal city that would match the grandeur of his expanding power and prestige,⁴⁾ and would be set apart from the crowded teeming city of Cordova. Al-Nāṣir appointed his son, al-Ḥakam II, as supervisor to assure a careful selection of the best materials and expert workmen.⁵⁾ Whether we call the result, with Dozy, the "Pompeii of the Arabs," or with Hariz the "Versaille of the Umayyads,"⁶⁾ it was a glorious city. It was here in al-Zahrā' that the physician-pharmacist al-Zahrāwī, was born and lived.

TENTH-CENTURY CULTURAL ACTIVITIES

Besides heavy government expenditure on construction and the army, large funds were expended for the arts and sciences. In cities across Spain, education was enjoyed by a segment of the people

¹⁾ R. P. A. Dozy, *Histoire des Musulmans d'Espagne* (vol. 3, Leiden, 1861), 90-4. (This work has been revised and edited by Lévi-Provençal, in Leiden, 1932).

²⁾ Torres L. Balbás, "Crónica arqueologica de la Espagna Musulmana," in *Al-Andalus*, 2 (1934): 336-42.

³⁾ George Sarton, *Introduction to the History of Science* (vol. 1, Baltimore, 1927), 628.

⁴⁾ Muhammad A. Enān, *Dawlat al-Islām fi al-Andalus, al-Fasl al-Awwal* (pt. 2, Cairo, 1952), 91-8.

⁵⁾ Marrākushī, *al-Bayān*, 2, 231-2.

⁶⁾ Joseph Hariz, *La Part de la médecine arabe dans l'évolution de la médecine française* (Paris, 1922), 23.

surprisingly broad for that time. Schools for higher learning began to spread in Cordova and other centers.¹⁾ Cultural studies, as we have noted received a strong impetus during the reign of al-Nāṣir (912-61), and continued to grow through the days of his son al-Mustansīr (961-76), who, beside being a champion of learning, was himself one of the most scholarly monarchs of Islam. The intellectual life in his time resembles that of al-Māmūn's reign, over a century and a quarter earlier, in the East. Interestingly, al-Mustansīr's educational philanthropy in the West coincided with a display of generous patronage to learning in the Eastern Caliphate under 'Adud al-Dawlah the Buwayhid (949-83). "Such abundant activities," Sarton states, "had never occurred before, not even in the best days of Alexandria."²⁾ It created an epoch of rewarding harvest.

Besides opening a number of new "public" schools, al-Mustansīr himself was a great collector of books. He sent agents to Baghdađ, Damascus, Cairo, and other centers in the Islamic world to purchase valuable works in the various fields of knowledge. According to his librarian, Talid al-Khassī, the Imperial Library became crowded with 400,000 volumes, the listing of which filled forty-four index catalogs of twenty folios each. Many of these works were annotated on the margin in al-Mustansīr's own handwriting, where he added biographical notes on the authors and other data. In his court he summoned copyists and bookbinders for work in the library.³⁾ Al-Zahrāwī practiced nearby and quite probably availed himself of the intellectual wealth at hand, in preparation for his work.

Here a brief discussion of the general cultural output of the period seems appropriate. This may help us perceive more vividly the milieu in which al-Zahrāwī wrote his *al-Tasrif*. Such cultural contributions, in or adjacent to al-Zahrāwī's time, were defined by

¹⁾ Dozy, in *Histoire*, 3: 108-10, speaks of the University of Cordova. We believe that there were private and public schools but no such central academy at this time. See Ṣā'īd ibn Aḥmad ibn Ṣā'īd, *Tabaqāt al-Umām*, Louis Cheikho, ed. (Beirut, 1912), 66.

²⁾ Sarton, *Introduction*, I: 647-8.

³⁾ Aḥmad Abū al-'Abbās ibn Muḥammad al-Maqqarī, *Nafh al-Tib min Ghusn al-Andalus al-Raṭib*, R. Dozy et al. eds. (vol. I, Leiden, 1858-61), 249-50, 256-7.

Ibn Ḥazm¹⁾ as embracing one or more of the following seven categories:

1. To invent or discover something for the first time.
2. To complete something theretofore unfinished.
3. To uncover and explain obscurity in the writings of a significant author.
4. To abstract a detailed work without distorting the actual meaning.
5. To gather together scattered information or facts about a certain subject.
6. To harmonize and systematize a confused and irregular work, the material of which is out of order.
7. To correct errors committed by earlier authors.²⁾

These points seem to have been accepted then as a convenient general standard of intellectual achievement; and we shall confine ourselves to them in the following paragraphs.

The Health Field

Spain in the tenth century, especially late in the century, made an appreciable contribution to Arabic developments in the health field. Several distinguished names stand high in accomplishment.

Among medical writers who follow a Greek pattern, Yahyā ibn Ishāq is a good example. The son of a physician, he himself was a distinguished physician and statesman in al-Nāṣir's administration. He wrote a medico-encyclopedic work in five books.³⁾ In clinical medicine and pharmaceutical technic, Ibn Mu'lukah and Sa'īd ibn 'Abd Rabbih deserve mention. The latter was a scholar, poet and author who wrote a drug compendium or "aqrābādhin",⁴⁾ the first of its kind known to have been written in Arabic Spain. He wrote almost a century after his predecessor in the Eastern cali-

¹⁾ 'Alī ibn Muḥammad ibn Sa'īd ibn Ḥazm (994-1064 A.D.), from a notable family and the prime minister to Caliph 'Abd al-Rahmān V. After the fall of the Umayyads he kept clear of politics for the rest of his life. He probably was the greatest scholar and most original thinker of Arabic Spain.

²⁾ Maqqari, *Nash al-Tib*, 2: 119-20.

³⁾ J. von Hammer-Purgstall, *Literaturgeschichte der Araber* (vol. 5, Vienna, 1854), 344.

⁴⁾ Uṣaybi'ah, 'Uyūn al-Anbā, 2: 39-41, 44-5.

phate, Sābūr ibn Sahl (d. 869), whose unofficial formulary became a standard text in public and hospital pharmacies,¹⁾ perhaps the first of its kind in Islam.

Turning to surgery, we find Hārūn ibn Mūsā al-Ashbūni, who acquired a good surgical reputation, serving at the court of al-Nāṣir and his son al-Hakam II; hence, he was contemporary to al-Zahrāwī, whose surgical work became so famous and influential. As far as we know from later biographies, al-Ashbūni left no surgical treatises, and Ibn Ḥazm did not list him among famous contributors to cultural activities in Arabic Spain.²⁾ Another physician who practiced surgery in the same period was Khālid ibn Yazid ibn Rūmān of Cordova, whose contribution was mainly in the field of botanical drugs "al-shajariyah" (الشجيري). Works on this and related topics continued to increase in number and significance in Spain during the three following centuries. It seems evident now, that these Arabic writers on *materia medica*³⁾, who emphasized drug identification, preparation, and therapy have excelled those of the Greco-Roman period.⁴⁾

Also in the field of botanical medicine was the alphabetically arranged work "On Simples" written by the physician Ḥāmid ibn Samjūn (d. 1001), who relied heavily on classical medical authors. His contemporary was Sulaymān ibn Juljul (fl. 983), a more distinguished medical author, who wrote several valuable medical works that deserve further historical study. His works have been cited

¹⁾ Muḥammad ibn Ishaq ibn al-Nadīm, *al-Fikriṣ* (Cairo ed., [1930]), 427.

²⁾ According to Maqqarī (*Nafh al-Tib*, 2: 108-121), Ibn Ḥazm wrote his epistle in reply to the challenging letter from his cousin Abū al-Maghīrah 'Abd al-Wahhāb. The writer of the letter, Ibn al-Rabib al-Tamīmī of Qayrawān, asks in ridicule why the scholars of Arabic Spain were lagging behind their colleagues in the East in furnishing chronologies and biographies of their great leaders, heroes, and men of letters and science. Ibn Ḥazm, through his reply, has given us one of the most interesting and valuable documents on the cultural development in Arabic Spain up to his time.

³⁾ By *materia medica* here we generally mean writings which deal with known curative substances, their origin, identification, and classification as natural products from plant, animal and mineral. Then, how they are collected, prepared, and administered in the treatment of diseases and their suggested or observed therapeutic "virtues".

⁴⁾ Max Meyerhof, "Esquisse d'histoire de la pharmacologie de botanique chez les Musulmans d'Espagne," in *Al-Andalus*, 3 (1935): 1-4.

by al-Zahrāwī repeatedly. He admired Dioscorides and wrote a commentary on his *Materia Medica*. Yet, ibn Juljul went further by writing another treatise on drugs that are not mentioned by Dioscorides. His philosophy of medical treatment, which has an Aristotelian teleological tendency, is of interest.

His central idea remained current in the West down to modern times: God created agents for the healing of the human body. These healing agents are distributed in plants and animals that walk or creep above the earth or swim in the deep, and in the various forms of minerals. All these are but emissaries of mercy and help to men.¹⁾

Ibn Juljul also reported the interesting story of how Dioscorides was translated in Arabic Spain.²⁾ From his account one could infer that the immediate impulse behind such an undertaking probably was the gift to al-Nāṣir, from the Byzantine Emperor Constantine VII in 948, containing a beautifully illustrated copy of Dioscorides. In 951 the same emperor sent to Cordova a learned monk, Nicola, to help translate this Greek manuscript into Arabic.³⁾ With him in this great project, a number of physicians participated. They desired to correct any errors in earlier translations and to identify the individual drugs. Among these distinguished physicians was the famous Jewish theologian and statesman, Ḥasdāy ben Shaprūt (915-70); Muhammad the botanist; and Abū ‘Abd Allāh the Sicilian, who knew Greek well and had the ability to identify the simples.⁴⁾ They supposedly made an improved Arabic version of Dioscorides, and it has been perhaps the most significant single work contributing to the development of *materia medica* in the Western caliphate. Al-Zahrāwī himself referred repeatedly to the work of Dioscorides, and we are inclined to believe that he made good use of this outstanding though incomplete version.

Philosophy and Theology

Orthodox theologians of Arabic Spain usually were bitter opponents

¹⁾ Uṣaybi‘ah, ‘Uyūn al-Anbā, 2, 46-8. ²⁾ *Ibid.*

³⁾ In the Eastern caliphate, a century earlier, Iṣṭifān Ibn Basīl, brought out an incomplete translation of the work of Dioscorides. It was corrected by Hunayn ibn Ishāq.

⁴⁾ See Max Meyerhof, "Die *Materia medica* des Dioskurides bei den Arabern," in *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 3 (1933), 72-84.

of philosophical studies and free thinking. Many philosophers were looked upon by fanatics as transmitters of heathen ideas.¹⁾ They were persecuted and their works burned publicly. This took place in particular when Muḥammad ibn Abī ‘Āmir (d. 1002) became a royal chamberlain (Hājib) and Vizir under Hishām II (976-1009) and served as the virtual ruler of the state.²⁾ In Arabic Spain, nevertheless, many authors kept on writing secretly, and many of the people are said to have continued to read and enjoy their philosophical works.³⁾ These activities became vigorous in the late eleventh century, culminating in significant contributions of the twelfth century, such as the renowned works of ibn Rushd (Averroes).

Astronomy and Mathematics

Many physicians who practiced the profession contributed also to mathematical and astronomical studies. For example, the physician ‘Abd al-Malik al-Thaqafi, who flourished in the second half of the tenth century, became an expert in land survey.⁴⁾ His contemporary, Maslamah al-Majrītī (d. 1008) of Cordova, studied Euclid and Ptolemy carefully and wrote several works in astronomy and mathematics, the best thus far in Spain. He also revised the astronomical and trigonometrical tables of the immensely influential Eastern mathematician, al-Khwārizmī (780-c. 850 A.D.)⁵⁾ of whom he was a worthy successor. Al-Majrītī was also a great teacher whose personality and intellectual abilities attracted students to his lectures from all over the country; and more than a few became distinguished scholars later on. Ibn al-Samh, for example, wrote an introduction to geometry and a treatise on the astrolabe. Another student of al-Majrītī was Abū al-Ḥasan ‘Ali ibn Sulaymān al-Zahrāwī (not to be mistaken for his contemporary, Abū al-Qāsim Khalaf, the central figure of the present study, Abū al-Qāsim Khalaf

¹⁾ Miguel Asin Palacios, "Tesis de la necesidad de la revelación," in *al-Andalus*, 3 (1935), 380-3.

²⁾ ‘Alī ibn Muḥammad ibn Hāzim, *The Ring of the Dove*, A. J. Arberry, ed. and tr. (London, 1953), 9; and Philip K. Hitti, *History of the Arabs* (6th ed., London, 1958), 531-533.

³⁾ Al-Maqqarī, *Nash al-Tib*, 2: 119, 125.

⁴⁾ Usaybi‘ah, *Uyūn al-Anba*, 2: 46.

⁵⁾ Sarton, *Introduction*, 1: 563, and Heinrich Suter, *Die Mathematiker und Astronomen der Araber und Ihre Werke* (Leipzig, 1900), 76-77, #176.

al-Zahrāwī). Abū al-Hasan, although a physician, made his main contributions in mathematics and astronomy.¹⁾

About 967, Gerbert of Aurillac, who later became Pope Sylvester II (999-1002), travelled in Spain and was exposed to these advances in science and philosophy.²⁾ Presumably this encouraged him to introduce such intellectual studies on his return to the West.

Poetry, Philology and Historiography

Poetry, philology and historiography were favorite topics of learned men in Arabic Spain. Poetry, for example, was enjoyed by caliphs, scholars, theologians and others, who were taken by its rhythmical attractiveness. In Spain, new forms of poetry such as

"al-Muwashshahāt" (الوشحات) and "al-Zajal" (الزجل) developed by this time. It is possible that these literary contributions influenced similar developments in French and Spanish vernaculars later on.

Arabic philology, surprisingly enough, advanced greatly in the country in spite of its geographical location far from the center of Arabism. Learned men of Arabic descent, or Spanish Christian and Jewish background excelled in these studies. A large proportion of the population was bilingual, but classical Arabic was the official language and the medium of scholarly contributions, although dialects naturally arose.³⁾

Historiography developed more rapidly and on a sounder base during the reign of al-Mustansir (961-76). The caliph himself encouraged this development, which matured in the centuries immediately following.

In recalling briefly the development of cultural activities in Arabic Spain prior to and during the lifetime of al-Zahrāwī, we are better prepared to study the man and to evaluate his work.

¹⁾ *Ibid.*, 82-83, #190.

²⁾ Carta de Vaux, "Astronomy and Mathematics," *Legacy of Islam*, 386.

³⁾ Trend, in his article "Spain and Portugal," *Legacy of Islam*, 5-8, went a little too far in exaggerating these differences of languages and races in the land.

CHAPTER TWO

A GREAT PHYSICIAN IN THE WESTERN CALIPHATE

ADMIRATION VS. INFORMATION

Al-Zahrāwī, the renowned physician of Arabic Spain during its golden age, figured prominently in the development of the health field, not only in his own country but in the West also.¹⁾ When Ibn Ḥazm (994-1064 A.D.) wrote his epistle on eminent scholars of Arabic Spain, al-Zahrāwī was one of four significant figures mentioned in the health field.²⁾

In the first half of the thirteenth century, Ibn Sa'īd, the historian, supplemented the biographical list of Ibn Ḥazm,³⁾ and here we find al-Zahrāwī listed among the best five in the health field—a high reputation that rested mainly upon the value of his book, *al-Tasrif*. By now apparently this work had acquired fame not only in Spain, but in North Africa (including Egypt) and the Eastern Caliphate as well.⁴⁾

Despite al-Zahrāwī's prestige—greater even in the West than in the Arabic world—the available information concerning his life and personality is fragmentary. Speculative details about the man spawned contradictions in the literature. This resulted in controversy that confused more than it clarified.⁵⁾

Al-Zahrāwī's available biography appears especially scanty when compared with other Arabic physicians of the same caliber.

¹⁾ Guillermo Folch Jou, *Historia de la farmacia* (Madrid, 1951), 104.

²⁾ Ahmad ibn Muḥammad al-Maqqarī, *Nafh al-Tib min Ghūṣn al-Andalus al-Rafīb*, R. Dozy et al., eds. (vol. 2, Leiden, 1858-61), 119.

³⁾ An interesting fact concerning Arabic historiography in Spain is that often a later historian completes the work that a predecessor started. A similar example is the biographical work written by Ibn al-Faraḍī (962-1013 A.D.)—who was born, lived, studied, taught and died in Cordova—which was supplemented in 1139 A.D. by Ibn Bashkuwāl (1101-1183). This supplement was in turn continued by Ibn al-Abbār, a historian of Valencia (1199-1260 A.D.), who brought it up to his time.

⁴⁾ al-Maqqarī, *Nafh al-Tib*, 2, 121-5.

⁵⁾ Lucien Leclerc, *Histoire de la médecine arabe* (vol. I, Paris, 1876), 437-9.

In Spain, for example, we know more about Ibn Juljul (d. 982), Ibn al-Wāfid (997-1074)¹⁾, and Ibn Rushd (Averroes, 1126-98) than we know about him. In the Eastern Caliphate, biographical information of eminent physicians, such as Ibn Māsawayh (Mesue the Elder, d. 857), al-Rāzī (Rhazes, c. 865-c. 925 A.D.) or especially Ibn Sīnā (Avicenna, 980-1037) is more satisfactory and comprehensive.

The result of comparing and evaluating all the obtainable data on al-Zahrāwī reveals a somewhat clearer picture than we have had heretofore. As we try to glimpse al-Zahrāwī through the veil of history half perceived, the background setting of his time may be recalled from the previous chapter.

BIRTH AND EDUCATION

The nickname "al-Zahrāwī" (الزهراوي), which is attached to the man's real name, Abū al-Qāsim Khalaf ibn 'Abbās, (أبو القاسم خلف بن عباس) suggests unmistakably that his birthplace was the royal city "al-Zahrā."²⁾ Giving a man his nickname or "Nisbah" after the town in which he was born was routine in the Arabic world, and still is.²⁾ If this is accepted, then al-Zahrāwī must have been born in or after 936 A.D., since we know that the construction of al-Zahrā' was started by Caliph al-Nāṣir only in that same year.

What about al-Zahrāwī's parentage? Historical records are silent. From our knowledge of the circumstances, it appears that a large percentage of the residents of al-Zahrā' were in some way connected with either the caliph, the court and the state service, or the construction of the palace, al-Zahrā', and the city around it.

Al-Zahrāwī's parents stood within a social hierarchy. At the top would be the royal family, the cabinet, the administrators and high government officials; while at the bottom, for example, stood servants, concubines, and construction laborers.

The wording of al-Zahrāwī's full name suggests that his father:

¹⁾ Abū al-Muṭarrif 'Abd al-Rahmān ibn Wāfid al-Lakhmī (998-1074) was a great physician and statesman of Toledo. He wrote several books pertaining to medicine and pharmacy.

²⁾ For confirmation of the accuracy of this "Nisbah," see Louis M'Alîl, *al-Munjid fi al-Lughah wa al-Adâb wa al-'Ulûm* (15th ed.rev., Beirut, 1956). (§) (Preface).

was called 'Abbās, a popular Arabic name since pre-Islamic times. One may speculate that if the father enjoyed a high social rank it probably would have been mentioned. With such men it was customary to pronounce the nobility of their ancestry.¹⁾

Manuscripts of *al-Taṣrīf* (Tub. 782, Bes. 502, Seh., and Par. 5772) shed new light on the origin of al-Zahrāwī's family heretofore not mentioned in the literature. The incipit to the seventeenth treatise in these manuscripts gives al-Zahrāwī the additional title of "al-Anṣārī," the physician (الأنصارى الطبيب). From this, one could infer that al-Zahrāwī is the scion of "al-Anṣār," (الأنصار) the people of "al-Madinah" (المدينة), and hence the nickname "al-Anṣārī." These were the settlers of the city who united to defend the Prophet of Islam against the people of Mecca in 622 A.D., and were thus known as the supporters or "al-Anṣār."²⁾ During and after the Arabic conquest of Spain, a good number of immigrants and warriors from the people of "al-Madinah," or "al-Anṣār," settled in the Iberian Peninsula. Al-Zahrāwī's ancestry then, one might infer, goes back to the Arabian Peninsula, to the inhabitants of "al-Madinah," the first city that accepted the message of Islam. His parents, for some unknown reason, moved in or after 936 A.D. to the royal city of al-Zahrā' where their son was born and reared. But we have learned nothing of his childhood or early youth.

Casiri,³⁾ Brockelmann⁴⁾ and other historians refer to al-Zahrāwī's residence and practice at Cordova. Here al-Zahrāwī would have had access to the city's unusual educational facilities of numerous schools and libraries.

Although al-Zahrāwī may have attained his education in Cordova proper—then the cultural and business center of Arabic Spain—we believe that he resided in al-Zahrā' for his practice.⁵⁾ This is a

¹⁾ Abū al-'Abbās Alḥymad Ibn Abī Usaybi'ah, 'Uyūn al-Anbā' fi Tabaqāt al-Āfiyyā (vol. 2, Cairo, 1882), 49, 64.

²⁾ Carl Brockelmann, *Geschichte der islamischen Völker und Staaten* (München, 1939), 17.

³⁾ Michael Casiri, *Bibliotheca Arabico-Hispana Escorialensis* (vol. 2, Madrid, 1770), 136-7.

⁴⁾ Carl Brockelmann, *Geschichte der arabischen Litteratur* (2nd ed. vol. 1, Leiden, 1943), 276.

⁵⁾ This inference is drawn from a statement found in the second treatise of

distinction without much difference since the two cities were so close to each other that they were practically one. The historian, al-Marrākushī even included al-Zahrā' as one of twenty-eight widely spread suburbs and quarters of metropolitan Cordova.¹⁾

Whether or not al-Zahrāwī benefited intellectually from the imperial library of al-Zahrā', his writings show what an industrious reader of medical works he must have been.²⁾

AL-ZAHRĀWI'S CORRECT NAME

We know the complete name and "nisbah" of the central figure of our research as: Abū al-Qāsim Khalaf ibn 'Abbās al-Zahrāwī (أبو القاسم خلف بن عباس الزهراني). However, in the Islamic world, some confusion arose as the result of inaccuracy in copying the name of al-Zahrāwī's father, 'Abbās. Thus, both forms "Ibn 'Abbās" and "Ibn 'Ayyāsh" (i.e., the son of 'Abbās or 'Ayyāsh) are encountered in Arabic records. But a thorough examination of early reliable sources and extant Arabic manuscripts of al-Zahrāwī's work helps to disperse the doubts. In general, these documents have called him "Ibn 'Abbās." The other form "Ibn 'Ayyāsh" is mentioned only occasionally in later manuscripts.³⁾ The structure of the two words in Arabic (عَبْسٌ) and (عَيْشٌ) is so close that a copyist's mistake becomes understandable. The slightest change in the number and the location of the diacritical marks above or beneath the letters (as in بُ or بٌ and سُ or سٌ) could easily cause the error. Brockelmann already recognized that the correct reading should be "Ibn 'Abbās," not "Ibn 'Ayyāsh".⁴⁾

A more perplexing controversy concerning al-Zahrāwī's correct name arose in the West. This was due to the variety of distorted

al-Tasrif. There, al-Zahrāwī refers to a man whom he knew by saying, "He was living [here] in our midst in al-Zahrā'" (كَنْ عِنْدَنَا بِالزَّاهْرَاءِ). Al-Zahrāwī could have made such a statement only if he were a resident of al-Zahrā' at the time to which the statement refers. (Len. fol. 230).

¹⁾ Ibn 'Idhārī al-Marrākushī, *al-Bayān al-Mughrib fi Akhbār al-Andalus wa al-Maghrib*, G. S. Colin and E. Lévi-Provençal, eds. (vol. 2, Leiden, 1951), 232.

²⁾ e.g., Wien, 476 A, fol. 2v.

³⁾ Ibn 'Ayyāsh was also copied by the eminent seventeenth century historian of Arabic Spain, al-Maqqarī, *Nash al-Tib* 2, 119.

⁴⁾ Brockelmann, *Arabischen Litteratur*, I: 276.

transliterations into Western languages of his first name, Khalaf; his title name, Abū al-Qāsim; and his nickname, al-Zahrāwī.¹⁾ The difficulty became significant when not a few historians of the health field thought of "Albucasis" as an original and distinguished author, and of "Alsaharavius" as a second person who was not only a compiler but a plagiarist. Such confusion, however, has been dispelled by modern scholarship. Leclerc stated in more than one place that the identity of "Albucasis" was established by Schenck in his *Biblia Iatrica*, and that Freind should have given credit to Schenck.²⁾ But Freind had later arrived at the same conclusion as Schenck through independent research.³⁾ Leclerc and Fisher further confirmed that any distinction between Alsaharavius and Albucasis is baseless.⁴⁾

AL-ZAHRĀWĪ THE PHYSICIAN

The intellectual achievement of al-Zahrāwī has been responsible, for the most part, in establishing his good reputation. Concerning his professional career, however, concrete information is scanty. This leaves a wide gap for speculation, even after piecing together the few inferences that could be drawn from al-Zahrāwī's own writings and from sparse data in the literature.

Gayangos and several other scholars, especially of more recent times, refer to al-Zahrāwī as a court physician to Caliph al-Nāṣir

¹⁾ The first name, Khalaf, has been transliterated: Halaf, Galaf, Schalaf, deKhalaf, Khalf, Gafar, Calag, and Chalaf. Abū al-Qāsim has been transliterated: Abulcasis, Buchasis, Abul-Kasem, Bulchasin, Bucasis, Abucasis, Abulcasim, Abucasem, Albucasis, Albucasa, Albucazi, Albucasem, Bulcasem, Bulcaris, Albucrasis, Cusa.

Al-Zahrāwī, as nickname, was modified in various ways, so that in some cases it is hard to recognize it:

Alsaharavius, Alzaharavius, Al-Zahararius, Alzahravi, Al-Zaharavi, Alzahravii, Alsaravius, Alsahrawi, Alsaravius, Azaravius, Alzarabi, Azaragi, Azarawii, Acaravius, Azaramis, Azrareus, Ezzahraui, Acaragui, Benaberazerin, and others closely related to the above.

We hope the above lists will serve as a convenient reference for future consultation if the reader encounters unfamiliar variants of al-Zahrāwī's name.

²⁾ Leclerc, *Histoire*, 444-5.

³⁾ Johannes Freind, *The History of Physick* (vol. 2, London, 1726) 126-8.

⁴⁾ George J. Fisher, "Abul-Casem Chalaf ibn-Abbas al-Zaharavi, commonly called Albucasis," *Annals of Anatomy and Surgery*, 8 (July-December, 1883), 21-3.

(d. 961).¹⁾ Gurlt,²⁾ Sarton,³⁾ Mieli,⁴⁾ and others speak of him as a court physician serving Caliph al-Mustansir (reigned 961-76), while a third group states that he was a court physician for both caliphs.⁵⁾ Leo Africanus, however, affirms that al-Zahrāwī had been the physician-in-ordinary to Ibn Abī 'Amīr al-Maṇṣūr (d. 1002 A.D.)⁶⁾ who although legally only the court chamberlain, was actually ruler of Arabic Spain under the nominal authority of Caliph Hishām II (976-1009).

Such assumptions, although based on uncertain evidence, were traditionally accepted. But a search of al-Zahrāwī's works and those of his contemporaries reveals no confirmation of this royal association. While it is clear that he lived during the reign of the two greatest caliphs of the Umayyads in Spain, who encouraged and patronized cultural activities, no early Arabic source known to us mentions al-Zahrāwī's service to the court or government. Moreover, his work was not dedicated to, or named after, a caliph or a patron, as was that of al-Rāzī⁷⁾ and many others. As a scholar or a teacher—both roles actually being explicit in his own writings and his title of "al-Shaykh"—he may have been wholly devoted to his studies, practice and teaching, without enjoying any appointment to the royal palace.

AL-ZAHRĀWĪ IN HISTORY

One of the earliest and most interesting historical accounts in-

¹⁾ Pascual de Gayangos, *The History of the Mohammedan Dynasties in Spain* (vol. 2, London, 1843), 149.

²⁾ Ernst J. Gurlt, *Geschichte der Chirurgie und ihrer Ausübung* (vol. 1, Berlin, 1898), 620.

³⁾ George Sarton, *Introduction to the History of Science* (vol. 1, Baltimore, 1927), 681.

⁴⁾ Aldo Mieli, *La Science arabe et son rôle dans l'Évolution scientifique mondiale* (Leiden, 1938), 182.

⁵⁾ Hasan Waṣā Dijjānī, *Geschichte der arabischen Medizin in Spanien* (Hamburg, 1934), 27.

⁶⁾ Ahmad Maulavi Azīmu'd-Dīn, *Catalogue of Arabic and Persian Manuscripts in the Oriental Public Library at Bankipore* (vol. 4, Calcutta, 1910), 28; the same quotation from Leo Africanus was also referred to by Leclerc, *Histoire*, 1: 437.

⁷⁾ al-Rāzī dedicates his *Kitāb al-Maṇṣūri*, (كتاب المنصور) called in Latin *Liber ad Abmansorem* to his friend and patron Maṇṣūr ibn Ishaq (not Ismā'il). Muhammad ibn Ishaq ibn al-Nadīm, *al-Fihrist* (Cairo ed. n.d.), 415.

cluding precious information about al-Zahrāwī is the previously mentioned epistle of Ibn Ḥazm (994-1064). Ibn Ḥazm there refers to his acquaintance with al-Zahrāwī himself by saying, "waqad adraknāh wa shāhadnāh" (وَهَادِنَا وَشَاهَدْنَا). This classical Arabic phrase has been interpreted in various ways.

It was translated by Gayangos as, "[Al-Zahrāwī] whom I know and with whom I was on good terms of great intimacy,"¹⁾ a statement from which Gayangos inferred that al-Zahrāwī was a contemporary of Ibn Ḥazm.

Azimu'd-Din referred to this conclusion as "incorrect." According to the latter, the phrase means: "I obtained the work [al-Taṣrif of al-Zahrāwī] and witnessed or saw it." Hence the original passage, according to Azimu'd-Din, does not assume that Ibn Ḥazm was a contemporary to al-Zahrāwī, as supposed by Gayangos, "it simply indicated that the author of the epistle [Ibn Ḥazm], hearing of the fame of this great work [al-Taṣrif], obtained a copy of it." Then Azimu'd-Din goes on to say "this can be safely assumed, that between the composition of Al-Zahrāwī's work and that of Ibn Ḥazm's epistle a long enough time must have elapsed to establish the fame of al-Taṣrif in the learned society of the Arabs of al-Andalus. This assumption gains further support from the fact that Ibn Ḥazm, towards the end of the epistle, speaks of his contemporaries in the present tense."²⁾

However, the statement seems to present no real problem. In fact the expression in question is still used in classical Arabic today in the same sense. The true meaning seems to lie between the two previous opinions. Ibn Ḥazm, in saying "waqad adraknāh" indicates that he existed when al-Zahrāwī was still living. It carries the implication that Ibn Ḥazm had probably reached at least boyhood or early youth before al-Zahrāwī died. Also, the word "washāhadnāh" "and we have seen him" means that Ibn Ḥazm saw al-Zahrāwī. He was not only living before al-Zahrāwī's death, but he saw him personally. He had reached by then an age when he could appreciate and later remember meeting or even getting acquainted with a figure so prominent as al-Zahrāwī.³⁾

¹⁾ Gayangos, *History*, 1: 187.

²⁾ Azimu'd-Din, *Catalogue Bankipore*, 4: 28.

³⁾ Leclerc refers to Ibn Ḥazm as a junior contemporary of al-Zahrāwī. He

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This could also mean that al-Zahrāwī died a long time before the writing of the epistle. And that is why, in effect, it became necessary for Ibn Ḥazm to say "we have seen him" (*washāhadnāh*). For if al-Zahrāwī only died recently, then it would be pointless to stress such an expression. But al-Zahrāwī being so long dead that a doubt might arise in the reader's mind as to whether Ibn Ḥazm had seen him or not, the latter feels impelled to add an assuring statement.

As a result of this information, we now have two approximate dates within which to confine the life span of al-Zahrāwī. He was surely born in or after 936 A.D., the year of the founding of his native city, al-Zahrā', and he died at an early date in the eleventh century,¹⁾ a long time before Ibn Ḥazm wrote his epistle.²⁾

Our reasoning regarding the time of al-Zahrāwī's death receives further confirmation from two rather precise biographical statements. Ibn Bashkuwāl³⁾ has gone into some detail and given what is probably the earliest well defined biography of al-Zahrāwī that has gone into some detail and survived. It was based mainly upon eleventh century sources considered reliable, such as the reports of Ibn Ḥazm⁴⁾ and al-Humaydī.⁵⁾ My [S.H.] English rendering of Ibn Bashkuwāl's account reads:

also quotes an undocumented passage by Conde saying that vizir 'Isā ibn Ishāq and al-Zahrāwī were the two celebrated physicians to Caliph al-Nāṣir. These were the early days of al-Zahrāwī's practice as a physician and we doubt if he was then renowned. Leclerc also endorses the years 912-1013, given by Leo Africanus, as al-Zahrāwī's life span, who on this basis lived to be 101 years old (Leclerc, *Histoire*, 1: 437-439). We believe that the statement about al-Zahrāwī's birth in 912 is confused with the year in which al-Nāṣir started his reign and is not based on historical evidence.

¹⁾ Gayangos, *History*, 1: 468-9.

²⁾ In the light of the above, the other dates that one encounters in the literature are apparently erroneous, such as the assumption of al-Zahrāwī's death in the twelfth century by Freind (*Physick*, 2: 128-9), Casiri (*Biblioteca*, 2: 137, who was quoted by Wiistenfeld), and Eugene M. O. Dognée ("Albucasis. Sa vie, son oeuvre," in *Etudes Archéologiques Linguistiques et Historiques* (Leiden, 1885), 304-5). Likewise, the unsupported report by Steinschneider that al-Zahrāwī died in the second half of the eleventh century seems improbable. (Moritz Steinschneider, "Die toxicologischen Schriften der Araber bis End XII. Jahrhundert" in *Virchow's Archiv*, 52 (1871), 482).

³⁾ Khulaf ibn 'Abd al-Malik Ibn Bashkuwāl (101-118) was a historian of Arabic Spain and the author of the biographical work *al-Silah*.

⁴⁾ al-Maqqari, *Nafh al-Tib*, 2: 119.

⁵⁾ Abū 'Abd Allāh ibn Muhammad ibn al-Futūḥ al-Humaydī (c. 1029-

"Khalaf ibn 'Abbās al-Zahrāwī, surnamed (كَلَافِي) Abū al-Qāsim: He was mentioned by al-Humaydī who said [of al-Zahrāwī] that he was of distinction in merit, religion and science (إِمْرَأَةِ). The special field of science wherein he excelled was medicine, in which he wrote a renowned (مشهور) encyclopedic book of great value (كَبِيرُ الْعِلْمِ). From it he omitted all unnecessary detail. He named it *Kitāb al-Taṣrīf liman 'Ajiza 'an al-Tālif*. It has been mentioned and praised by Abū Muḥammad ibn Ḥazm, who said: Of a truth, in the whole field of theoretical and practical medicine, no other work yet has been written about treating ailments that surpassed it in precision and completeness. He [al-Zahrāwī] died after [the year] four hundred [A.H.] in al-Andalus. He was also mentioned among the great teachers [scholars] (شِيَعَة) by Ibn Sumayq."¹⁾

This historical document concerning al-Zahrāwī²⁾ is significant because it was written by a native biographer who lived only a century after him and who collected data from junior contemporaries of the man and from their students and associates. Therein Ibn Bashkuwāl clearly stated that al-Zahrāwī died after 400 A.H. (1009/10 A.D.)³⁾

So far as we know, the only historian before the seventeenth

1095) was a student and a friend to Ibn Ḥazm in Spain. He travelled to many countries in the East and died in Baghdaḍ. He is the author of the historical work on learned men of Arabic Spain entitled *Jadīdat al-Muqtabis* (the full title in Arabic reads جَدِيدُ الْمُقْتَبِسِ فِي ذِكْرِ رَوَاهُ اِنْدَلُسِ رَاجِلٌ حَدِيثٌ وَّاحِلٌ فَقِهٌ وَّالْاِدَبٌ وَّفُرْقَى النِّيَاهَةِ وَالشَّعْرِ). This was probably the first work to refer to al-Zahrāwī. In checking the edition by Muḥammad T. al-Ṭabkhi (Cairo, al-Sa'ādah press, 1952), p. 195, No. 421, we found that Ibn Bashkuwāl had copied al-Humaydī, as stated by the former, almost verbatim. We compared this also with the recent edition of Ibn Bashkuwāl's *al-Šilāh*, by 'Izzat A. al-Ḥusaynī (vol. 1, Cairo, al-Sa'ādah press, 1955), p. 162.

¹⁾ Ibn Bashkuwāl, *Kitāb al-Šilāh*. Franciscus Codera, ed. (vol. 1, Madrid, 1882), 166, No. 368. This biography is similar to that written earlier by al-Humaydī.

²⁾ Ibn Bashkuwāl's biographical sketch was quoted in full by the historian al-Dabbī (d. 1203) in his famous work on distinguished men of Arabic Spain Ahmad ibn Yahyā al-Dabbī, *Bughyat al-Mullāmis fi Tārikh Rijāl Ahl al-Andalus*. Franciscus Codera and Julianus Ribera, eds. (vol. 1, Madrid, 1884-5), 271-2.

³⁾ The same date and phrasing of the statement has been repeated by the eminent bibliographer Hajji Khalfah (d. 1658 A.D.) (Hajji Khalfah, *Kashf al-Zunūn 'an Asāmi al-Kutub wa al-Funūn* (vol. 1, Cairo, 1856), 211). It was probably Khalfah's account on which Brockelmann and others based their judgment (Brockelmann, *Arabischen Literatur*, 1, 276).

century who gave an exact date for the death of al-Zahrāwī was Leo Africanus. He reported al-Zahrāwī's death in 404 A.H. (1013 A.D.), the year when Cordova was invaded and sacked by the Berbers and the royal palaces of glorious al-Zahrā' were tragically destroyed.¹⁾ Leclerc and other historians agreed that such a date is probably not far from truth. And so we believe, on this evidence, that al-Zahrāwī probably died between 1010 and about 1012 A.D.²⁾

Having established as carefully as possible the approximate dates of al-Zahrāwī and described the environment in which he lived, let us now look more closely into his influence on succeeding generations, and after that examine his work.

¹⁾ Reinhart Dozy, *Histoire des musulmans d'Espagne* (vol. 3, Leiden, 1861), 308-311.

²⁾ The Arabic words (عَدَ الْأَرْبَابِ . . . مُتَّ) used by Ibn Bashkuwāl carry an implication of soon after 400 A.H. This makes the approximate death date of 1010 to 1013 less speculative.

CHAPTER THREE

THE WRITINGS OF AL-ZAHRĀWI REACH THE WEST

THE TRANSMISSION PERIOD

Although Arabic civilization politically menaced medieval Europe, nevertheless the two were linked "by a hundred ties that even war and fear could not sever."¹⁾ Such express European cultural ties with any other Eastern civilization, save those of the Jewish religious and literary legacy, are difficult to find.

But wherever Arabic culture reached in Europe during the late Middle Ages it captured favorable attention. This is true of its influence on the healing arts. While Arabic authors were standing on the shoulders of the ancient Greeks, their contributions to Western Europe still seem indisputable,²⁾ and seemed far more impressive when first revealed to Western scholars.

Numerous Arabic works were translated into Latin or other Western languages, during the twelfth and thirteenth centuries. This began at a time when classical works—including writings in the health field—were known mainly through extracts. These translations from the Arabic made such an impression that even when Western scholars had direct access to the original Greco-Roman classics, upon which Arabic learning was mainly based, they often continued to rely with great reverence upon some of the translated Arabic works. Examples in the medical field are the works of such figures as al-Rāzī and Ibn Sīnā from the Eastern caliphate and al-Zahrāwī from the Western Caliphate.

Here we are mainly interested in al-Zahrāwī, a man whose work remains highly reputed without being either well known in its content or adequately evaluated. Al-Zahrāwī provides a good example of what happened to Arabic culture after it reached the West.

¹⁾ H. A. R. Gibb, *Ibn Battuta* (London, 1929), [i].

²⁾ Irom Landau, *Arab Contribution to Civilization* (San Francisco, 1958), 8-9; also David Ricaman, *The Story of Medicine in the Middle Ages* (New York, 1935), 49-59, and De Lacy O'Leary, *How Greek Science Passed to the Arabs* (London, 1949), 3-5.

In the literature, as far as we can judge, there seems no foundation for a positive stand. Because if "several famous writings" mentioned by Uṣaybi‘ah were other than the treatises of *al-Taṣrif*, why were they not mentioned elsewhere in the literature? It is also worth noting that Uṣaybi‘ah—in his medical studies, practice, residence, and travels—did not go beyond the borders of the Eastern Caliphate mainly Syria and Egypt; his acquaintance with Arabic Spain was based on previous biographies and oral reports from a variety of sources.¹⁾ More over, he did not mention seeing any of al-Zahrāwī's writings, as he customarily did if he knew a work at first hand. We are, therefore, led to believe that Uṣaybi‘ah probably meant the thirty treatises of *al-Taṣrif*.

Also considering al-Zahrāwī's reputation, one might presume that if he had written another work it would have been found and commented upon or at least mentioned, in the literature. However, not a single authentic manuscript, other than those belonging to *al-Taṣrif*, has been reported. Thus, relying on available evidence one concludes that *al-Taṣrif*—a work he wrote late in his life—is the only literary contribution of al-Zahrāwī that survived through the centuries.

THE TRUE MEANING OF THE TITLE

The word *al-Taṣrif* has been often used to designate the work of al-Zahrāwī. This was done only for the sake of convenience. The full title of the work reads *Kitāb al-Taṣrif Liman ‘Ajiza ‘an al-Ta’ālif* (not *al-Ta’ālif*) كتاب التصريف لمن غير عن التأليف), a title that causes certain difficulties for historians and translators.²⁾ The true meaning has not been generally agreed upon. In some cases the interpretations come close but not exactly to the point. Others transliterate

¹⁾ Amin A. Khairallah, *Outline of Arabic Contribution to Medicine and Allied Sciences* (Beirut, 1946), 34-5.

²⁾ Wien, 476A, fol. 2b.

³⁾ Aldo Mieli, *La Science arabe et son rôle dans l'évolution scientifique mondiale* (Leiden, 1938), 182. Moritz Steinschneider in his, *Die europäischen Übersetzungen aus dem arabischen bis Mitte des 17. Jahrhunderts* (Berlin, 1956), pp. 55-56, voiced the same feeling that it is hard to find an equivalent for the meaning of the Arabic title, and especially the word *Taṣrif*.

the Arabic title unsatisfactorily, or coined titles irrelevant to the actual subject matter.¹⁾

Actually, the title was presented and explained in clear and simple terms by the author himself. Therefore, let us try to clarify the question by looking for the motives that led him to choose such a title.

In the introduction to his work al-Zahrāwī writes: "And I have named it *Kitāb al-Tasrif Liman 'Ajiza 'an al-Talīf*, because of its wide-range usefulness in serving the physician in a multitude of ways. [The physician] comes to its satisfying counsel with all kinds of problems, as necessity arises. And due to its availability he need not resort to extensive reading of the various compendiums and the detailed writings from the East. Neither will he be compelled to [consult] the inexplicable works of the ancients, inasmuch as the intellectual benefits thereof cannot be gained save by spending long years at hard study and continuous, strenuous investigations."²⁾ This is a clear explanation, and it seems an honest one in view of the author's apparent instructive purposes throughout this whole undertaking. For he meant *al-Tasrif* to be a daily guide and a manual to be used, referred to and relied upon, by his students—whom he calls his children—and by practitioners.

The reader will find access to the true meaning of the title through the above translated portion of the author's introduction.

THE TREATISES: THEIR NUMBER, SEQUENCE AND CONTENT

Al-Tasrif is characterized by an encyclopedic nature and outlook. It embraces a wide range of topics touching the various branches of the health field known and developed at the time. Some novel features will be discussed later.

Many translators and medical historians have presented inaccurately the number³⁾ and the sequence⁴⁾ of the treatises in

¹⁾ See, for example, Fielding H. Garrison, *An Introduction to the History of Medicine* (4th ed. rev., Philadelphia, 1929), 131-2; Ralph H. Major, *A History of Medicine* (Springfield, Ill., 1954), 250; and Heinrich Haeser, *Lehrbuch der Geschichte der Medizin und der epidemischen Krankheiten* (vol. 1, Jena, 1875), 578.

²⁾ Madr. 5007, fol. 1 b.

³⁾ For example, Johannes Freind, in *The History of Physick* (vol. 2,

CHAPTER FIVE

GENERAL SURVEY OF THE CONTENTS AND STRUCTURE OF *AL-TASRIF*

EARLIER APPROACHES TO SYSTEMATIC STUDY

Al-Tasrif embraces within its thirty treatises the various fields of the healing art then known. The work resulted from more than forty years¹⁾ of intelligent study and personal observation. Each of these treatises, although an integral part of the whole, has a separate identity of its own.²⁾ Yet, certain treatises can be organically linked together, a fact that justifies systematic classification of the whole.

A number of attempts have been made along these lines in the past. But most constructions seem based upon an inadequate concept of the contents. During the late Middle Ages in the West, the first two treatises together with the twenty-eighth, *Liber Servitoris*, were sometimes regarded as al-Zahrawi's whole *al-Tasrif*. Until almost the nineteenth century, medico-historical research to elucidate the character of the work centered upon comparing this portion of *al-Tasrif* with the surgical part, which was also well known.³⁾ Some came to think of the work as being organized into two major parts, the theoretical and the practical. Probably because of the attention given to the edition of *Liber theoricae nec non practice* (1519), this misleading division became traditional through the centuries.⁴⁾

So far, one of the best general analyses concerning *al-Tasrif* has been the interesting study made by Leclerc,⁵⁾ and his research was

¹⁾ Vel. fol. 228 b. and Madr. 5007, fol. 1a.

²⁾ Wien 476B, fol. 5 B. and Madr. 5007, fol. 1 b.

³⁾ Lucien Leclerc, *Histoire de la médecine arabe* (vol. I, Paris, 1876), 441-3.

⁴⁾ Ferdinand Wüstenfeld, *Geschichte der arabischen Ärzte und Naturforscher* (Göttingen, 1840), 85.

⁵⁾ Leclerc, "Abulcasis; son oeuvre pour la première fois reconstituée," in *Gazette hebdomadaire de médecine et de chirurgie*, 2nd ser. No. 34-36, II (1874), 537-48, 569-78, which was largely incorporated into and elaborated upon in his *Histoire*, I: 437-57.

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heavily relied upon by Valensi.¹⁾ But even Leclerc's treatment was broad and general, corresponding to the wide scope of his monumental history of Arabic medicine. Hence, he was prevented from discussing in detail the contributions of individual physicians.

In view of the renown of his survey, we wish to make a few remarks about what Leclerc did and did not do with regard to *al-Taşrif*. First, Leclerc did discuss treatises one and two, although sparingly. Second, he did consider treatises three to twenty-five as a unit concerned with the study of compounded drugs. Third, he made a rapid assessment of treatises twenty-six to twenty-nine inclusive. Last, he elaborated upon the surgical part,²⁾ which he previously had rendered in a scholarly way into French.

But Leclerc did not describe the actual content of the majority of the treatises, not even their titles. Those treatises that he did mention were only viewed in the light of earlier assumptions that came to us from the Middle Ages. Moreover, in rendering into French some titles, which often are distorted or incomplete, Leclerc apparently relied on the Latin version rather than the Arabic—for his quotations all were Latin. Finally, he exaggerated the application of a statement by Hajji Khalfah (d. 1658 A.D.).

As Leclerc did not give a French translation of Khalfah's report, here is a rendering into English: "Al-Taşrif . . . was divided by him [al-Zahrāwi] into thirty treatises, the majority of which are on compounded drugs, (طَرِيقُ الْكُنَّاتِ) by the system followed in earlier medical compendia (الكتابات)." ³⁾

¹⁾ Robert Valensi, *Un chirurgien arabe, Abulcasis* (Montpellier, 1908), 30-39, 85-96; a thesis that did not reach either new viewpoints or normal scholarly standards.

²⁾ Leclerc, *Histoire*, I: 446-457; and Fidel M. Fernández, *La Medicina arabe en España* (Barcelona, 1936), 56-61.

³⁾ In the phrase (طَرِيقُ الْكُنَّاتِ), translated "by means of compendiums," we follow Hajji Khallah, *Lexicon Bibliographicum et Encyclopaedicum a Mustafa bni Abdallah K. Jelebi (Haji Khalfa)*, Gustav Fluegel, ed. (vol. 2, Leipzig, 1837), 302-303 or No. 3034. We accepted this rendering because it conforms to the concise style and comprehensive scope actually found in *al-Taşrif*. The word "metonymies" (الكتابات) as rendered in the edition of Hajji Khalfah, *Kashf al-Zunūn 'an dsmā al-Kutub wa al-Funūn* (vol. 1, Cairo, 1856), 221 seems to be a copyist error. Khalfah's other edition (vol. 1, Istanbul, 1941), 411-412 agrees with Fluegel, using also the word "al-Kunnāt (الكتابات).

We agree that compounded drugs are discussed in the majority of the treatises, yet this does not imply, as Leclerc apparently thought,¹⁾ that they are wholly devoted to such information. Furthermore, Khalfah's acquaintance with *al-Taşrif* perhaps was not as thorough as Leclerc assumed, since in discussing surgery Khalfah names a number of Arabic surgeons without mentioning al-Zahrāwī at all. He neither refers to al-Zahrāwī's surgical treatise nor to his significant drawings of surgical instruments.²⁾

Later on, we shall see that what Khalfah, and following him, Leclerc, referred to as compounded drugs consists of more than is commonly understood by that term. It is a systematic and organized pharmaceutical study, including compounded drugs, pharmaceutical preparations and technic, and various forms of medications administered in the healing art. These wider aspects form a central part of the present study.

Leclerc's approach perhaps inspired later historians to divide the entire *al-Taşrif* into three parts: the medical; the pharmaceutical and chemical;³⁾ and the surgical.⁴⁾

A NEW APPROACH TO CLASSIFICATION

The need for a fuller and more revealing classification of the contents of *al-Taşrif* seems clear. This work was divided by its author into treatises (جلاّث), sections (ابواب), chapters (فصل) and so on, rather typical of the elaborate classification noted in medieval Arabic works. In spite of its systematic organization, *al-Taşrif* does not lend itself to unified topical classification as easily as might be supposed from the first look.

Two difficulties might be mentioned: First, a number of the treatises overlap as to subject matter. Therefore, it is hard to decide where each should be classified. (Probably this seems disturbing only because of modern insistence that rational medicine be cleanly subdivided and specialized.) Second, certain individual treatises embrace materials related to more than one general topic. Thus,

¹⁾ Leclerc, *Histoire*, I: 444.

²⁾ Hajji Khalfah, *Kashf*, I: 299.

³⁾ The word chemistry and its derivatives is used in this study as it was understood in the late Middle Ages.

⁴⁾ Aldo Mieli, *La Science arabe et son rôle dans l'évolution scientifique mondiale* (Leiden, 1938), 182.

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there exists a risk to proper understanding in placing such a treatise in one category or the other. With these cautions in mind, we proceed.

THE CONTENT OF AL-TAŞRİF BY CATEGORIES

We can divide the work into eight main categories. Each will embrace the treatises devoted primarily to the same general topic. In cases of overlapping, we shall indicate which category we prefer and the reason for it.

Our rearrangement of the work in these main categories constitutes an alteration of the author's structural approach as seen in the table of contents. We are imposing our own structural scheme on *al-Tasrif* to make more apparent its scope, relative emphasis, and character. Here then is an overview according to the eight categories:

I. The author's introductions and epilogues, his personal aims, ethical advice, and professional principles.

II. General and clinical medicine, embracing: medical theories and definitions, nature of man and temperament, anatomy, pathology, classification of diseases, symptoms and treatment. It constitutes treatises one and two.

III. The surgical part, with illustrations of instruments for instructional purposes, consisting of the thirtieth treatise.

IV. Pharmacology and therapeutic treatment of a variety of diseases: treatises six, eight, twelve, twenty one and twenty-three.

V. Pharmacology and therapeutic treatment of a specific ailment or organ: treatises nine and twenty-two.

VI. Hygienic and dietary regulations in sickness and health, and the relation thereof to medical practice: treatises twenty-six and twenty-seven.

VII. Preparation and stability of drugs, admissible substitutions, weights and measures, drug synonyms and terminology, pharmaceutical manufacturing and technique (including extraction, filtration, collection and storage): treatises twenty-eight and twenty-nine.

VIII. Materia medica, therapeutic "virtues" of simple and compounded drugs in the treatment of the various diseases, pharmaceutical forms and dosages of medication, and the methods of

their preparation and administration: treatises three, four, five, seven, ten, eleven, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, twenty-four and twenty-five.

By thus grouping related materials together for the purpose at hand, we can now briefly describe the content of each category to provide a readily comprehensible survey. However, in discussing the individual categories, we shall try to place al-Zahrāwī's writings in perspective by making some comparisons with a classical writer and a contemporary Arabic writer who had similar objectives. The first will be Paulus Aegineta, a seventh-century Byzantine physician,¹⁾ representing late classical writers²⁾ who greatly influenced Arabic thought.³⁾ The second celebrated physician with whom we shall bring al-Zahrāwī into comparison particularly is his contemporary, 'Alī ibn 'Abbās al-Majūsī (علی بن عبّاس المجوسی) (d. 994 A.D.), known to the West as "Haly Abbas."⁴⁾ The work of al-Majūsī, known as al-Malikī (الملکی) or *Kāmil al-Sinā'ah al-Tibbiyah* (كامل الصناعة الطبية),⁵⁾ was highly praised by al-Qiftī as practical, comprehensive, and well organized.⁶⁾

¹⁾ Paulus Aegineta, a Byzantine Greek, flourished more than three centuries before al-Zahrāwī, in Alexandria during the early days of Islam and was known among the Arabs as "the obstetrician." He wrote his compendium of medicine in Greek, compiled from Galen, Oribasius, and others, in seven books. Although Oribasius, the famous physician of the fourth century, was also well known in Islam, yet the largest part of his writings was lost (Lynn Thorndike, *A History of Magic and Experimental Science* (vol. I, New York, 1923), 569).

²⁾ According to Max Meyerhof and G. P. Sobhy (*The Abridged Version of "The Book of Simple Drugs" of Ahmad al-Ghāfiqī* (Cairo, 1932), 9), there is no modern edition of the work of Paulus in Greek. They therefore recommended "the excellent translation with commentary by Francis Adams, *The Seven Books of Paulus Aegineta*, 3 vols., London, 1845 (1844)-7," which we shall use in this study.

³⁾ Amin A. Khairallah, *Outline of Arabic Contributions to Medicine and the Allied Sciences* (Beirut, 1946), 21.

⁴⁾ While al-Zahrāwī practiced at the capital of the Western caliphate in Spain, al-Majūsī—originally from al-Ahwāz in southwestern Persia—flourished under the Eastern caliphate in the days of the great patron of learning, 'Adud al-Dawlah (949-982 A.D.) We have no evidence, neither in tradition nor in historical documents, that either one knew the writings of the other or that they ever met.

⁵⁾ In this study we shall use the first printed edition of the work (*Kāmil al-Sinā'ah al-Tibbiyah*, 2 vols., Cairo, 1294 A.H. (1877 A.D.). Two Arabic

In comparing al-Zahrāwī with these two men emphasis will be put upon some of the pharmaceutical aspects of *al-Tasrif*, particularly in categories seven and eight. However, our intention is to present at the same time an overview of the whole *al-Tasrif*.

THE EIGHT CATEGORIES

I. *Introductions and Epilogues.*

The few brief preludes and postludes associated with several treatises of *al-Tasrif* provide interesting data not otherwise accessible in extant historical records. They shed a little light upon the personality and professional life of the author, explain his intentions, and offer ethical advice and professional principles.

Here al-Zahrāwī addresses his "children" (أَنْفُسِي), a term probably used in a figurative sense. It could of course mean children of his own studying the art of healing, but more likely refers either to the anticipated unseen students into whose hands will come one of the copies of *al-Tasrif*, or closely associated students under his personal tutelage. We know of no evidence for or against any particular interpretation, but we are inclined to believe that al-Zahrāwī was addressing his students.¹⁾ Thus he appears to have been an ardent teacher who presented *al-Tasrif* primarily for guiding, instructing, and admonishing his students. He writes, "For your sake I have written this book, my children, for you alone."²⁾

Al-Zahrāwī urges his students to put more effort in studying their assignments carefully, and to apply what they learn in their close contact with patients. He advocates specialization in the health field, in a time and a state where the physician often was a theologian, or astronomer, or a philosopher as well. Al-Zahrāwī tends to stick closely to the practice and technique of his profession; and we

manuscripts also have been consulted (on microfilm): the Damascus manuscript at al-Zahiriyyah Library, No. 7565 General (275 folios) and the manuscript of the National Library of Medicine, at Washington, D.C., Sommer No. A 26 Item 2, dated 1726 A.D. We wish here to express our gratitude to al-Zahiriyyah Library and the National Library of Medicine for their courtesy in allowing the microfilming and study of the two manuscripts.

¹⁾ 'Ali ibn al-Hasan al-Qiftī, *Ikhbār al-'Ulamā' bi Akhbār al-Hukamā'* (Cairo, 1326 A.H. (1908 A.D.)), 155-6.

²⁾ Madr. 5007, fol. 35.

²⁾ Madr. 5007, fol. 1 a.

know of several occasions when he shunned dialectical arguments (see, e.g., Wien 476B, fol. 91b-93b.)

Nevertheless, it seems that he follows certain themes that had been touched upon earlier by Paulus Aegineta. As al-Zahrāwī writes to instruct his "children," so does Paulus. They both felt the need for systematizing medical knowledge into a single practical manual for use by students of medicine as well as by practitioners. Paulus argued that lawyers—who generally practice in cities where an ample supply of books is available and who usually do not need to find the required information instantly—have compendiums of their own; then how much more urgent is it for a physician—who practices not only in cities but in small villages, in deserted areas and on ships far at sea—to have compendiums pertaining to their field, to consult promptly when need that cannot be postponed, arises.¹⁾ The same theme, but without comparison with the profession of law, is elaborated upon by al-Zahrāwī. Indeed, he incorporates the idea into the title of his book.

Al-Zahrāwī goes further than Paulus in presenting two aspects: first, a series of ethical admonitions to his „children” about their professional career;²⁾ second, and more important, a plan to give special attention to pharmaceutical preparations and their administration in medical treatment.³⁾

The preface to the work of al-Majūsi, however, differs in two respects. First, unlike al-Zahrāwī, he dedicates the work with flowery praises to his patron, ‘Adud al-Dawlah.⁴⁾ Second, al-Majūsi gives an interesting, brief biographical survey, including eminent Greek, Syriac and Arabic physicians up to his time. It presents general critical notes that evaluate the physicians and their writings.⁵⁾ This al-Zahrāwī did not attempt.

II. General and Clinical Medicine

The subject of general and clinical medicine was considered of

¹⁾ Paulus, *Seven Books*, tr. by Adams, I: (xvii)-xviii.

²⁾ For this reason Gustav Flügel stated that *al-Tasrif* contains more advice to practitioners than other Arabic works of the same type (*Die arabischen, persischen und türkischen Handschriften der Kaiserlich-Königlichen Hofbibliothek zu Wien* (vol. 2, Vienna, 1865), 525-7).

³⁾ Wien 476B, fol. 1-2 b.

⁴⁾ Al-Majūsi, *Al-Maliki*, I: 3.

⁵⁾ *Ibid.*, 3-5.

primary significance by the author. He urges his students to study it carefully; "and after you become well oriented in these first two treatises," al-Zahrāwī adds, "then it will be much easier for you to understand the rest of the text."¹⁾

The first treatise opens with short chapters on the definitions and divisions of the healing art, the elements, the nature of matter, man and disease, meteorology in relation to health, humors and temperaments. These topics were not given any special consideration by Paulus, being mentioned only casually. The same we found to be true in the available part of the voluminous work of *al-Hāwi* by al-Rāzī.²⁾ But al-Majūsī surpasses the author of *al-TAŞRİF* in devoting a great portion of his first treatise³⁾ and a few sections of the fourth treatise to such studies, with dialectical interpretations added.

In his work, al-Zahrāwī proceeds from such topics to an interesting discussion on human anatomy: the bones, muscles, eye, ear, lung, heart, liver, and so on. While this subject is less emphasized by Paulus, al-Majūsī devotes to it the second and third treatises of *al-Maliki*.⁴⁾

Al-Zahrāwī specifically designates the second treatise as a reference manual for classifying diseases, their symptoms and their treatment. He discusses diseases that are frequently encountered in his time, the number mounting to three-hundred and twenty-five kinds.⁵⁾ As expected, the classical sequence of studying the diseases from the head down to the foot is followed here. Paulus earlier, in his third book, did the same; but al-Majūsī departs from this classical pattern. In the sixth treatise of *al-Maliki* diseases are

¹⁾ Wien 476B, fol. 91 b. — 93 b.

²⁾ A microfilm of the Arabic manuscript of al-Rāzī, *Kitāb al-Hāwi al-Kabir* (كتاب الْهَاوِي الْكَبِيرُ), No. 449 from the Osler Library at McGill University in Canada, was examined on microfilm sent as a courtesy from the Osler Library. Al-Majūsī, who flourished a few decades after the death of al-Rāzī, studied the complete manuscript of *al-Hāwi* and criticized its author for completely neglecting such topics. (*Al-Maliki*, I: 5).

³⁾ Twenty treatises constitute *al-Maliki*, of which the first equals roughly 4% of the total work.

⁴⁾ Al-Rāzī deals with this topic in his *al-Mansūri* (see P. de Koning, *Trois traités d'anatomie arabes* (Leiden, 1903), 3-89); and no doubt he influenced al-Zahrāwī, as *al-TAŞRİF* testifies.

⁵⁾ Madr. 5007, fol. 35 b.

discussed from the point of view of the senses, will, and natural reaction—a physio-psychological approach, in modern jargon. In treatises seven to ten al-Majūsī elaborates upon the importance of diagnosis, while his major discussion of diseases and their treatment is loosely dispersed through treatises thirteen to fifteen and seventeen to eighteen inclusive. Such dispersed material throughout al-Majūsī's text makes it harder for the student or the practitioner to find what he wants. Al-Zahrāwī keeps his attention focused upon the problem at hand so that the reader can easily follow him, as the translated headings for his subsections show:

- The diseases of the stomach are twenty-six.
- The diseases of the fundament are twelve.
- The diseases of the liver are fifty-five.
- The diseases of the kidneys are twenty-five.
- The diseases of the bladder are eighteen.
- The diseases of the penis are seventeen.
- The diseases of the testicles are fourteen.
- The diseases of the uterus are forty-six.
- The kinds of abscesses and tumors are thirty.¹⁾

The symptoms and treatment of these and other diseases are discussed—each in its section. Much of the material here has been touched upon, with more or less emphasis, by Paulus. Yet, after examining the manuscript of *al-Hāwi*,²⁾ we feel that al-Zahrāwī was more dependent on al-Rāzī than on Paulus. In the subsection on smallpox and measles al-Zahrāwī copied al-Rāzī almost verbatim.³⁾ Nevertheless, al-Zahrāwī expresses his own opinion on certain disputed medical points, introducing each with the phrase, "Thus says Khalaf" (his first name).

Finally, al-Zahrāwī concludes this long treatise with a detailed discussion of three kinds of fevers and their treatment. Here he quotes the work of Ishāq ibn Sulaymān al-Israelī, entitled *The*

¹⁾ Len. fols. 1 a., 55 b., 72 b., 91, 102 b., 113 b., 126 b., and Madr. 5007, fol. 147 b.

²⁾ Oslers Ms. No. 449; see such topics as jaundice, headache, child hygiene and treatment, and stomach ailments.

³⁾ Johannis Freind, *The History of Physick* (vol. 2, London, 1727), 124-5. In checking the Arabic text, we found that al-Rāzī's influence on al-Zahrāwī here is great.

Book on Fevers or Kitāb al-Hummāyat (كتاب الحميات).¹⁾ This elaborate chapter on fevers is the 32nd in the treatise, conveniently following the 26th chapter on child health; the 27th on the care of the aged; the 28th on rheumatic ailments, the 29th on pustules, pimples, boils and tumors and their treatment; the 30th on poisons and their antidotes, and the 31st on skin diseases.

III. *The Thirtieth Treatise on Surgery*

We have referred to al-Zahrāwī's surgical treatise in chapter three, in connection with its transmission to and influence on Western Europe since the second half of the twelfth century. Here it is only to be discussed in relation with the other categories of *al-Tasrif*'s content.

The introduction to this treatise reveals the author's emphasis upon the importance of studying anatomy. This topic has been mentioned under our second category, the text of which is closely related to the thirtieth treatise. In fact the author considers the first two treatises, which form the previous category, a necessary prelude to understanding surgery and its skillful practice.²⁾ Thus we are led to classify this thirtieth treatise in the category immediately following that of the first two treatises, in spite of its wide separation from them in the original text.

This part of *al-Tasrif* has probably acquired more recognition and comments than any other. For this reason, and because of our special interest in the pharmaceutical aspect of al-Zahrāwī's work, we here devote to it only a few remarks.

The author divides the thirtieth treatise into three sections. The first and longest section—in 56 chapters—is devoted to cautery, used in no less than fifty kinds of diseases. The second section, in about 99 chapters, describes accurately a great number of operations performed with the knife. Here is probably the first record of interdiction of amputations above the knee and the elbow due to the danger involved.³⁾ The third section discusses in 35 chapters the treatment of fractures, dislocation of bones, and luxations, and

¹⁾ Len., fols. 307-309.

²⁾ Wien 476A, fol. 1.

³⁾ J. Hermann Baas, *Grundriss der Geschichte der Medicin und des heilenden Standes* (Stuttgart, 1876), 184-5.

includes a description of what is now known as the "Walcher position" in obstetrics, and instrumental delivery in parturition. Al-Zahrāwī reportedly was the first to write on the treatment of deformities of the mouth and dental arches, the first to describe hemophilia lucidly, observed that spinal paralysis is caused by injury within the medulla or the cord, and performed with much skill cranioclasty, for delivery of a dead foetus, describing his operation fully.¹⁾

The Surgical Illustrations

Of special interest in this treatise are more than two hundred illustrations of surgical and dental instruments, originally and beautifully portrayed by al-Zahrāwī himself²⁾ for the purpose of instruction. They are probably the earliest of their kind known to have survived³⁾ and are properly esteemed as valuable relics in the health field.⁴⁾ All these drawings the author carefully and clearly explains; and they long influenced the illustration of surgical instruments.⁵⁾ Leclerc felt that these instruments and their use represent a rational approach in surgery that has historical significance.⁶⁾ Freind believed that al-Zahrāwī was the only one up to his time to describe the instruments he used in each surgical ope-

¹⁾ Fielding H. Garrison, *An Introduction to the History of Medicine*, (4th ed. rev., Philadelphia, 1929), 132; on hemophilia, W. J. Bishop, *The Early History of Surgery* (London, 1960), 73; on spinal paralysis and cranioclasty, M. Z. Siddiqi, *Studies in Arabic and Persian Medical Literature* (Calcutta, 1959), xix and xxi, and second "bāb" of the thirtieth treatise of *al-Tasrif*.

²⁾ Wien 476A, fol. 1 a.

³⁾ Ernst J. Gurlt, *Geschichte der Chirurgie und ihrer Ausübung* (vol. 1, Berlin, 1898), 621. Garrison—who erroneously placed the death of al-Zahrāwī in the early 12th century—stated that since Gurlt's time many earlier illustrations of medieval surgical instruments have been mentioned by Sudhoff and others. However, he did not specify any particular one, nor did he explain whether or not such illustrations were meant for instructional purposes as were those of al-Zahrāwī. (Garrison, *Introduction*, 132).

⁴⁾ For a study of the surgical instruments in Latin versions and a survey of the libraries that contain such versions, the reader may consult Karl Sudhoff, *Beiträge zur Geschichte der Chirurgie im Mittelalter* (vol. 2, Leipzig, 1918), 16-84.

⁵⁾ Donald Campbell, *Arabian Medicine and its Influence on the Middle Ages*, (vol. 1, London, 1926), 88.

⁶⁾ Lucien Leclerc, *La Chirurgie d'Albucasis* (Paris, 1861), vi-vii.

ration.¹⁾ While it has been reported that al-Zahrāwī's surgery was mainly founded on the work of Paulus,²⁾ who confessed complete reliance on his Greek predecessors, we have seen that al-Zahrāwī introduced illustrations of surgical instruments for instructional purposes and presented independent information based upon much experience and personal observation.³⁾ His descriptions also tend to be clearer and more comprehensive than those by Paulus.

However, according to Abū Ganimā, al-Majūsi ranks first among the three in the completeness of his description of surgical manipulations.⁴⁾ Be that as it may, it is clear that al-Majūsi, in his nineteenth treatise on surgery (consisting of 110 chapters), relies heavily on Paulus and al-Rāzī; and his experience in this field is not particularly extensive.⁵⁾ Adams' commentary on the work of Paulus goes further and affirms that al-Majūsi copied "almost everything from Paulus."⁶⁾ And although al-Zahrāwī, too, was indebted to Paulus in the writing of the whole surgical treatise, Adams declares that al-Zahrāwī gave "More original matter on surgery than any other Arabian author."⁷⁾

IV. Pharmacologic and Therapeutic Treatment

After the general introduction to the health field, the classification of diseases, and the manual operations, let us turn to al-Zahrāwī's discussion of pharmacologic and therapeutic effects of medicines.

In this topical category we start with the sixth treatise on bitter laxatives, including mainly those used, according to the author, for the evacuation of two Galenic humors, black bile and yellow bile (اللَّدْرُونَةُ الْمُسْهِلَةُ لِلْبَرْدَ).⁸⁾ Among such drugs, scammony, aloes,

¹⁾ Freind, *History Physick*, 2:130; and William Nimeh, *Alminara de la Medicina árabe* (Mexico, 1944), 69-73.

²⁾ Max Neuburger, *Geschichte der Medizin* (vol. 2, pt. 1, Stuttgart, 1910), 178-9.

³⁾ E.g., see Leclerc, *Histoire*, 1: 454-6.

⁴⁾ Mohammad Subhi Abu Ganimā, *Abul-Kasim ein Forscher der Arabischen Medizin* (Berlin, 1929), 9-10.

⁵⁾ Baas, *Geschichte*, 182.

⁶⁾ Paulus, *Seven Books*, tr. by Adams, 2: 247.

⁷⁾ Taym., fol. 144 a.

cuphorbium, colocynth, and squill are designated for ailments that require a strong purgative. For this reason the author divided the patients who undergo such treatment into two classes: the healthy persons, and the poor in health. The second class is advised to take a much smaller dose of these strong bitter laxatives than is the first. In administering these drugs, the author quite often—and apparently for therapeutic reasons—recommends the use of warm water.¹⁾

Such medications are generally named either after the major ingredient used, such as safran pills (حب الزعفران), or to indicate the therapeutic effect, such as the fever pills (حب المئيات).

Al-Zahrāwi lists a considerable number of prescriptions for treatment of the various diseases. The arrangement of each of these formulas is, almost consistently, in the following form: the title, the ingredients by weight or volume, method of preparing and compounding, the pharmaceutical form, the method of administration, and the recommended dosage. Generally each formula starts or ends with mention of the disease or, more often, the multiplicity of diseases for which this medication is used.

In the same way, the author approaches the writing of the eighth treatise, which centers around the preparation of mild, good tasting laxatives and their therapeutic benefits. This treatise he calls "The Royal" (الملائكة الالوية) because the bitterness and unpleasant odor of the compounds have been masked and the method of preparation improved. As a skilled physician-pharmacist, he seeks ways to make his medications acceptable to certain patients who abhor bitter, smelly drugs. Moreover, he mentions that such patients might vomit if forced to take unpleasant drugs.²⁾

To such considerations Paulus had devoted only a few pages in his seventh book.³⁾ The number of simple and compounded drugs he includes is relatively limited.

Al-Majāsi likewise treats this topic briefly, although more extensively than Paulus did.⁴⁾ Al-Majūsi appears to be greatly influenced by Paulus. For example, in comparing the attraction of a laxative

¹⁾ Taym., 146 a.—9 b.

²⁾ Taym., fol. 154b.—155a.

³⁾ Paulus, *Seven Books*, tr. Adams, 3: 480-4.

⁴⁾ Al-Majūsi, *al-Maliki*, 2: 139-48, 554-5.

drug for excess humors with the attraction of a magnet for iron, al-Majūsi copies Paulus almost verbatim.¹⁾ But it should be mentioned that the pharmacologic effects of laxative drugs are especially elaborated upon by al-Majūsi.

In the twelfth treatise al-Zahrāwi deals with such topics as the properties of aphrodisiacs, consisting of a number of simple and compounded pharmaceutical preparations, and the medications used against obesity and to fatten the thin. He discusses also the treatment recommended both for a deficiency and an excess of semen; and for increasing or decreasing milk in a mother's breast.

A similar approach is observed in the twenty-first treatise. Its three sections are devoted to the following topics: dentifrices and drugs used in toothache and extraction, erosion, gingivitis and gum bleeding, tonsilitis, and throat troubles. For his prescriptions al-Zahrāwi employs drugs of animal origin—as others did long before and after him—as well as drugs from the mineral and plant kingdoms. Hence, nails, blood, milk, and urine are among the ingredients used for medication that then seemed rational, however bizarre they seem today. Indeed, he rarely appears superstitious, as he does in insisting on using the left horn of an animal and not the right one (see "bāb" 7, of "maqālah" 21).

Generally he seems to emphasize hygienic measures in professional practices. For example, he always requires clean containers, equipment and instruments, and asks for careful washing of raw materials used in drug preparations. He specifies that dry ingredients be finely ground, especially those used in compresses. He prescribes the powders for sprays, or vapor sprays, and for therapy of mouth and throat. He also employs sublingual medications repeatedly.²⁾

The coverage of these topics by Paulus was meager, especially if we consider them from the pharmaceutical or the therapeutic side. He discussed mainly the qualifications of the woman who is to nurse a child, her diet, and how to correct bad qualities of milk; and the problem of an excess of semen.³⁾

Similarly, al-Majūsi gives only cursory attention to these topics,

¹⁾ *Ibid.*, 139-43.

²⁾ Par. 5772, fols. 110-21.

³⁾ Paulus; *Seven Books*, tr., Adams, I: 5-10, 48.

devoting but three short paragraphs to the following titles: Drugs or diet used as galactagogues; the aphrodisiacs; and the drugs that reduce or dry milk and semen.¹⁾

Of the three authors, al-Zahrāwī covers these topics much more adequately from the pharmaceutical, the pharmacologic, and the therapeutic point of view.

The twenty-third treatise, the last in this category, discusses the preparation and the application of bandages, dressings, plasters and compresses (الصلادات) to any ailing part of the body. The author commends their use as a technique of great service in medical practice.

Here as in other treatises, besides compiling from earlier works that he considers reliable,²⁾ al-Zahrāwī adds a few formulas of his own that he had tried (جرب or جربة) and found to be worthwhile (جيد).³⁾

Paulus earlier had devoted special attention to plasters in his seventh book.⁴⁾ He listed the formulas for ingredients from which a plaster is to be made, with the quantity required of each. Al-Zahrāwī describes not only the methods of preparation and application but the cases in which they are most useful.

Al-Majūsī lists about forty-two prescriptions dealing with the subject.⁵⁾ He follows closely the procedure presented by Paulus. In the number and variety of formulas he is much surpassed by al-Zahrāwī, who apparently throughout his work devotes more attention to pharmaceutical procedures and preparations than al-Majūsī does.

A possible explanation might be inferred as follows: Under the Eastern Caliphate, pharmacy developed rapidly, and special pharmacists separate from the medical profession, with public pharmacy shops, sprang up so that a physician might not feel a pressing need

¹⁾ Al-Majūsī, *al-Malikī*, 2: 99-100.

²⁾ Al-Zahrāwī was scrupulous in giving credit to authors whom he copied or cited. Among those often cited are Hippocrates, Dioscorides, Galen, Paulus, Ahrun the priest, Māsawayh Sr., Iḥunayn, Sābūr ibn Sahl, al-Rāzī, Ishāq ibn ‘Imrān, Ibn al-Jazzār, Ibn Juljul, and others.

³⁾ Par. 5772, fols. 140 b., 175 a.—177b.

⁴⁾ Paulus, *Seven Books*, tr. Adams, 3: 558-580.

⁵⁾ Al-Majūsī, *al-Malikī*, 2: 580-5.

for extensive pharmaceutical knowledge. However, in contemporary Spain nothing of that sort is evident; hence there the typical physician was his own pharmacist. This, we may speculate, was one reason for the attention given to pharmaceutical subjects by al-Zahrāwī, a physician who met practical needs in all of his writings.

V. Special Therapy

This category is so closely related to the previous one that the two could have been examined together. However, we have reserved the present discussion for material on more specific disease entities.

The ninth treatise of *al-Tasrif*—the first in this category—as an example, centers around the care and treatment of cardiac diseases. With Galenic tone, al-Zahrāwī attributes the causes of heart ailments to an excess of phlegm that disturbs the body's equilibrium.¹⁾ Therefore in several formulas—which he copied, modified or devised—the author recommends “hot aromatic drugs” to counteract the excess of phlegm and black bile. Such treatment, he asserted, harmonizes with the animal spirit (الروح الحيوان).²⁾

Al-Zahrāwī's pharmaceutical preparations, whether simples or compounded, were used with consideration to the “hot” or “cold” (حرار or بارد) “qualities,” and to the degrees of hotness or coldness. These formulas represent a variety of pharmaceutical forms: decoctions, potions, syrups, confections, pills, et cetera. In each instance, the author indicates how, with what, and when the medication should be administered.

In his twenty-second treatise, the author leads the reader to expect more specialized and inclusive discussion than he presents (in the copies presently available). In the introduction to the treatise he announces that the comprehensive scope of its text will “stand alone without information being required from other treatises, save in the little known and the scarce.” The major topics discussed here are chest and lung ailments, hoarseness of voice, and asthma, and their treatment. The text is divided into three sections: drugs for the cure of “hot cough,” “cold cough,” and the

¹⁾ Taym., fol. 161 a.-162 a.

²⁾ Taym., fol. 161 a.

intermediate. Here again the text overlaps topics that are broadly discussed in other treatises of *al-Tasrif*.

To conclude this brief reference to the character of the twenty-second treatise, we can select two points of interest for mention: first, al-Zahrāwī recommends that a thick decoction be used as poultices for chest treatment. When one poultice becomes dry it is to be replaced by another, until the ailing chest is relieved. Second, he emphasizes special diet in the regimen of treatment, following the Hippocratic tradition. Eggs, chickens, fish, and certain dairy products are listed, together with instructions for their use. In addition he urges complete rest for the patient.¹⁾

Paulus had devoted comparatively little to heart and chest ailments. Besides their casual mention in the course of his voluminous work, there are two small related chapters. The first is entitled "On Coryza, Catarrh, Affections of the Trachea, and Cough," wherein two formulas for pills, one inhalation, one decoction and five electuaries were recommended for various kinds of cough.²⁾ Concerning cardiac diseases, Paulus summed up the matter with the statement, "when the heart itself is primarily affected, the case is far beyond all medical aid, occasioning sudden death."³⁾ Therefore he recommended, briefly, certain hygienic measures and special diets.

Al-Majūsī seems to go beyond al-Zahrāwī in the description of the symptoms and the causes of heart ailments.⁴⁾ Yet he is less comprehensive in presenting methods of treatment in the various cases. In dealing with chest ailments, al-Majūsī is objective, clear, and organizes his material well, with special emphasis on the pharmacologic and therapeutic aspects. He divides his discussion mainly into chapters considering the treatment of coughs resulting from ailing throat or trachea; voice coarseness; ailing chest and lung; asthma and oppression; pneumonia; haemoptysis; productive cough; consumption; pleurisy; and lung and chest abscesses.⁵⁾

By and large the physician may find the discussions in the works

¹⁾ Par. 5772, fol. 137.

²⁾ Paulus, *Seven Books*, tr. Adams, 1: 468-473.

³⁾ *Ibid.*, 1: 501-502.

⁴⁾ Al-Majūsī, *al-Maliki*, 1: 357-358, 2: 327-328.

⁵⁾ *Ibid.*, 1: 310-327.

of al-Majūsi and Paulus the more interesting; while al-Zahrāwī's is of greater interest to the pharmacist.

VI. *Hygiene and Diet*

This category embraces treatises twenty-six and twenty-seven. They are closely related in that they both cover the general topic of promoting health by the best possible use of diet and medicine.

The twenty-sixth treatise starts with an interesting introduction concerning the importance of a good diet. According to al-Zahrāwī, a diet should be sought primarily for nourishment and not for its capability of giving pleasure. Nevertheless, nutritious food that is also delicious, he admits, is to be highly recommended, especially in convalescence. He urges practitioners to rely on diet whenever it is satisfactory before resorting to the use of drugs.

The author also discusses varieties of food in regard to their usefulness and harmfulness in different diseases. He divides his text into twenty-eight chapters, including the following topics: special diet recommended for patients stricken with acute diseases, such as smallpox, measles, pneumonia, and itching; and patients with fever, cough, diarrhea, colic, melancholy and jaundice; then a presentation of regimen that helps to reduce or increase weight, increase milk in the mother's breast, or cause diuretic action. This is followed by an interesting discussion of "intermediate" diets that suit most healthy people, and of different kinds of bread and other victuals.

Throughout the text, the author presents the method of preparing each diet in three steps. In the first, he specifies the required quantity of the ingredients. In the second, he describes carefully the technique involved in every process; and third—when the diet is ready—the amount and the time of administration.

The last chapter, the twenty-eighth, speaks of means for obtaining the waters of pomegranate, apples, pears, grapes and the like. For example in preparing the water of sour grape he recommends that sour grapes be pressed, strained and the filtrate put in sunlight for a few days, then strained again, and stored for use by filling the vessel to the brim and closing tightly. For the water of apples, he recommends cooking, mashing and straining the apples, then storing the water thereof in a convenient container, as in the case of sour grapes.

In the twenty-seventh treatise the author divides the text into two major sections: the faculties of regimen and the properties of drugs. The first is subdivided into eleven chapters, including the following topics: grains, bread, and other types of food made of grains; waters, including mineral waters, wines, syrups, honeyed water and vinegar; it also discusses herbs, vegetables and fruits, as well as animals, fowls, and fishes, their products, and uses in diet. Interestingly, the section ends in the eleventh chapter with a discussion on clothes (for use in hot and cold weather), and their colors in relation to climate, as well as the effects of these colors on the eye.

In the first main section of this interesting treatise for the history of hygiene, al-Zahrāwī essentially follows Hippocratic teaching as modified by later writers, particularly Galen. Paulus similarly had discussed in a Galenic tone the powers of the various foodstuffs and their influence to correct the body's temperaments, as well as the qualities and degrees of function of administered medicines.¹⁾

The second section centers mainly on discussing—in alphabetical order—the drugs found or frequently used in the author's native land, Spain. The whole approach is based upon the classical theory of the qualities of hot, cold, moist, and dry, and their four degrees. Al-Zahrāwī may well have been influenced by the elaborate work of al-Kindi,²⁾ especially in assigning grades of humoral qualities to compound drugs as a net product of the additive and the counter-balancing effects of combining several supposedly active constituents.³⁾ Al-Zahrāwī does not go into al-Kindi's complicated calculations and geometric proportions of degrees of faculties, yet he seems to apply such a system in determining the degrees of faculties expected from mixed drugs or diets containing more than two ingredients, and each with its own degree of humoral faculty or action.

¹⁾ Paulus, *Seven Books*, tr. by Adams, 1: 106-178, 3: 2-16.

²⁾ Ya'qūb ibn Ishāq al-Kindī, or Alkindus as known in Latin (d.c. 873), is called "the philosopher of the Arabs." He wrote voluminously on a variety of subjects, including medicine and pharmacy.

³⁾ The classification of the degree of actions or qualities of compounded drugs (more than two ingredients) was the elaboration of al-Kindi and is not found in Galen. Curt Lantzsch, *Abu Jusuf Jakub Alkindi und seine Schrift 'De Medicinarum Compositarum Gradibus'* (Leipzig, n.d. [1921]), 2-7. Janus, Suppl. V

Al-Majūsi touches upon similar topics in a traditional way, but he is brief and less concerned with describing the methods used in these preparations.¹⁾

VII. Practical Pharmacy

The twenty-eighth treatise, it will be recalled, was transmitted to the West under the title "Liber Servitoris" (see p. 28). The author explains his motives in writing this part. He read in several drug compendiums and *agrābādhīns* that certain medicines have to be obtained and prepared for use in drug compounding before the need arises. This includes medicines made of drugs that are to be pressed for the extraction of juices or that require burning and washing. He realizes the significance of these topics, and also considers that their discussion would give the practitioner a better ability to differentiate between the good product and the inferior one.²⁾ Therefore, he launched upon this study enthusiastically; and he seems to have been filling a gap in the Arabic medical development in Spain that needed attention.

The author divides his text into three major sections, which we shall characterize as to scope and approach. The first section deals with drugs of mineral origin, such as alum, vitriols, lead, iron, copper, and stibnite (سبيون), an ore from which antimony is extracted. It discusses also how these minerals are obtained, ground, and stored in a convenient container ready for use. Among various processes mentioned are the method of washing tutty (غسل التوتّي)³⁾, the zinc oxide found in chimneys of furnaces in which ores of zinc are smelted; the calcination of mercury and arsenic; and the preparation and washing of ceruse,⁴⁾ which was found in plentiful quantities near Cordova.⁵⁾

¹⁾ Al-Majūsi, *al-Maliki*, 1: 19-22, 177-199.

²⁾ Vol., fol. 1 a. See also P. J. Amoreux, *Essai Historique et Littéraire sur la médecine des arabes* (Montpellier, 1805), 20-25, 74, 116-119.

³⁾ Tutty in its various forms as an ore was likewise discussed in a tenth-century Coptic manuscript. See M. Emile Chassinat (editor and translator), *Un Papyrus médical copte*, (Cairo, 1921), 95-97.

⁴⁾ Apparently the exposure of metal in thin plates in applied chemical processes was known in Arabic lands. (Alfred Sigel, "Buch der aufgehenden Sterne des Muhammad b. Abi'l-Hair al-Hasani," in *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 8 (1942): 140-5). Al-

The second section deals with the preparation of drugs from plants and the care that should be taken to preserve the dried parts, as in the case of dried flowers of violet. Likewise it discusses the extraction of juices, as in the case of aloes; the preparation and straining of gums and the ptyalin (pulps) of certain plants; and the peeling of fruits and seeds, as in the case of quince.

Other methods and techniques of pharmaceutical interest are also included: pressing, and drying (probably for making tablets—see figure 14 a and b—or for the grinding of dried material into powder form); the preserving of the products obtained; and the straining of decoctions and liquids (see figure 15).

Al-Zahrāwī gives the reader other types of pharmacobotanical information also, such as the region in which a plant grows or is obtained, a description of the plant itself, and the method for obtaining the part or parts used medicinally.

Furthermore, this section includes technologic procedures, such as the bleaching of vinegar; the washing of oils and taking out the lees; the making of squill vinegar and distilling the water therefrom; the burning of amber, coral, turpentine, and the vine tree to obtain their ashes for medicinal uses; the improvement of purgative drugs such as scammony and colocynth by the addition of aromatic or good-tasting substances; and the knowledge of the seasons and times for the collection of medicinal plants for future use.

Of interest also is the author's description of the technique and the apparatus used in the distillation of aromatic waters such as rose.¹⁾ Although al-Zahrāwī used and recommended the aromatic water and the oil of rose—together with an interesting description of equipment and technique—²⁾ yet there is no indication that he separated the one from the other during the same process.³⁾

Zahrāwī used thin plates in the preparation of ceruse (white lead), composed of lead hydroxide and carbonate (see Vol., fol. 4 a).

¹⁾ Henry Coppée, *History of the Conquest of Spain by the Arab-Moors* (vol. 2, Boston, 1881), 385.

²⁾ Julius Ruska, "Über die von Abulqasim az-Zahrawi beschriebene Apparatur zur Destillation des Rosenwassers," in *Chemische Apparatur*, 24 (1937), 313-5. See also Bes. 503, fol. 625 b.

³⁾ Bes. 503, fol. 625 b. called to our attention by E. Gildemeister and Fr. Hoffmann, *Die Ätherischen Öle* (3rd. ed., vol. I, Leipzig, 1928), 27-28.

³⁾ R. James Forbes, *Short History of the Art of Distillation*, Leiden, 1948, 31-32.

The third section deals with the preparation of drugs from animal origin, with instructions for distinguishing the good product from the bad. It involves the operation of burning shells, nails, hoofs, bones, snakes, rabbits, and scorpions to reduce them to a form suitable for therapeutic uses. It also discusses the processes for removing biles and brains of fowl, which were used as aphrodisiacs; the collecting of children's urine, to be added to "hot" medicines; the extraction of fats from geese and hens; and the preparation of sal ammoniac (*nushādūr*).¹⁾

Furthermore, the author presents simple techniques of practical

utility—for example, removing foam and purifying of honey, and how honey should be cooked with water; and the bleaching of beeswax by dipping a cold glass cup into a hot mixture of wax and water, then taking the cup out immediately, and exposing the wax collected upon it to sunlight until bleached.²⁾

This brief survey shows that the fame acquired by this treatise during the Middle Ages and early Renaissance was not inappropriate. It was praised by Leclerc for its independence and interesting merits.³⁾ In the history of chemistry as applied to medical practice and the compounding of drugs, Cumston went so far as to claim for it a unique originality.⁴⁾

The twenty-eighth treatise as a reflection of al-Zahrāwī's interest in practical pharmaceutical matters can be better appreciated after it is compared with the works of Paulus, who did not present a special study of preparing drugs as al-Zahrāwī did here. In dealing with substances of mineral origin, such as gypsum, ceruse, litharge, arsenic, mercury, and lead, Paulus presented only a few paragraphs on the symptoms and the pharmacologic effects they produce in the human body.⁵⁾ He did mention the therapeutic uses of honey and honeyed water, as well as the method of preparing honeyed

¹⁾ For the methods of preparation, properties, and the etymology of the word "nushādūr" (the Arabic equivalent of sal-ammoniac), the reader may consult H. E. Stapleton, "Sal-Ammoniac: A Study in Primitive Chemistry," in *Memoirs of the Asiatic Society of Bengal*, I, No. 2 (1905): 28-29, 40-41.

²⁾ Vcl., folia. 48 a-49 b.

³⁾ Leclerc, *Histoire*, I: 452-453.

⁴⁾ Charles G. Cumston, *An Introduction to the History of Medicine* (New York, 1926), 210, 452.

⁵⁾ Paulus, *Seven Books*, tr. by Adams, 2: 233-8.

water,¹⁾ which were copied almost literally by al-Majūsī.²⁾ In discussing the simples, al-Majūsī's work seems clear and well organized. He divides them as al-Zahrāwī does, according to their origin—plant, mineral, and animal³⁾—but with much less elaboration in regard to the pharmaceutical technique involved.

The twenty-ninth treatise constitutes the second part of this category. It is divided into five sections: the first section gives drug synonyms, mainly in Arabic, Greek, Syriac, Persian and the vulgar tongue (Spanish). In a couple lines or so for each item, al-Zahrāwī gives the Arabic name of the drug and its equivalent in other language or languages (with corrections if any), description, and therapeutic uses. For example, in discussing the melilot (*الكليل*)⁴⁾ he restricts himself to its definition, its equivalent in other languages, and its uses. He does not go into pharmaceutical botany at length. This fact is underscored by a comparison with Dioscorides,⁵⁾ who gives the following detail concerning melilot: the areas in which it grows, description of the superior and inferior kinds, color, smell, and its therapeutic effects alone or when mixed with other ingredients.⁶⁾

The second section explains synonyms frequently encountered in medical books. They are not synonyms for drugs as in the earlier section, but concern equipment, technical terms, and idioms. The author's aim is to make such terms understood by his readers. For example, he starts with the alembic (*الأنبوب*), and discusses in a couple lines its meaning and usage. This approach is significant to

¹⁾ *Ibid.*, I: 178.

²⁾ Al-Majūsī, *Al-Maliki*, I: 199.

³⁾ *Ibid.*, 2: 100-138.

⁴⁾ Vel., fol. 52.

⁵⁾ In this work we are using mainly the Arabic version of Dioscorides' *Materia Medica*, translated by Stiphān ibn Basil, corrected by Hunayn ibn Ishaq, edited by César E. Dubler and Elias Terés (Tetuán y Barcelona, 1952). This translation is perhaps inferior to that made in Arabic Spain, which was already available in the time of al-Zahrāwī. However, even this more accurate version was apparently incomplete. Heinrich Schipperges, in reviewing the above-mentioned edition, in *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften*, 39 (1955), 285 prefers, Ibn Basil's translation. Here, for comparison, the English version, edited by Robert T. Gunther, *The Greek Herbal of Dioscorides* (2nd ed., New York, 1959) was also consulted.

⁶⁾ Dioscorides, *Materia Medica* (Arabic version), 2: 258.

pharmaceutical technology, and we find no equivalent of it in the works of Paulus and al-Majūsī.

The third section is devoted to studying the admissible substitution of one drug for another, if the desired drug is missing or unobtainable at the time, a standard feature of drug books up to the modern period. Here the author emphasizes dosage, as one weight of a drug might equal in its effect either half or double the dose of a substitute.

Although this topic is not given comparable attention by al-Majūsī, Paulus already had given it adequate treatment, drawing "from the works of Galen" a complete list "of medicines which may be substituted for one another."¹⁾ This list possibly influenced al-Zahrāwī later.

The fourth section is concerned with how long certain simples and compounded drugs remain stable before deteriorating. Here again al-Zahrāwī groups drugs according to their origins in the Aristotelian natural kingdoms: minerals, such as gold and silver; plants including gums and seeds; and animal drugs such as those extracted from hoofs, nails and so on.²⁾

Paulus had devoted no special attention to this study in spite of the fact that he described the individual simples in some detail. But in the work of al-Majūsī we find a brief chapter concerning the stability of compounded drugs, such as theriacs, confections, electuaries, and pills.³⁾ In another brief chapter, al-Majūsī emphasizes certain methods and regulations for choosing good quality drugs and the means for proper handling and storing. Then he goes one significant step further by suggesting the detection of the therapeutic effects and potency of drugs by experimenting on human bodies in the various diseases,⁴⁾ a pharmacologic approach of historical interest that al-Zahrāwī has not so explicitly suggested.

The fifth and last section in this category compares and interprets measures and weights.⁵⁾ They are presented in alphabetic

¹⁾ Paulus, *Seven Books*, tr. by Adams, 3: 604-8.

²⁾ Br. Mus., fols. 243 a.-246 b.

³⁾ Al-Majūsī, *al-Maliki*, 2: 533-534.

⁴⁾ *Ibid.*, 2: 85-86; 2: 251-252.

⁵⁾ This section—which has been translated into French and annotated by Sauvaise—is probably the earliest Arabic work of its kind in our possession today; from it Ibn al-Bayṭār borrowed extensively in his chapter on weights

the Arabic title unsatisfactorily, or coined titles irrelevant to the actual subject matter.¹⁾

Actually, the title was presented and explained in clear and simple terms by the author himself. Therefore, let us try to clarify the question by looking for the motives that led him to choose such a title.

In the introduction to his work al-Zahrāwī writes: "And I have named it *Kitāb al-Tasrif Liman 'Ajiza 'an al-Talīf*, because of its wide-range usefulness in serving the physician in a multitude of ways. [The physician] comes to its satisfying counsel with all kinds of problems, as necessity arises. And due to its availability he need not resort to extensive reading of the various compendiums and the detailed writings from the East. Neither will he be compelled to [consult] the inexplicable works of the ancients, inasmuch as the intellectual benefits thereof cannot be gained save by spending long years at hard study and continuous, strenuous investigations."²⁾ This is a clear explanation, and it seems an honest one in view of the author's apparent instructive purposes throughout this whole undertaking. For he meant *al-Tasrif* to be a daily guide and a manual to be used, referred to and relied upon, by his students—whom he calls his children—and by practitioners.

The reader will find access to the true meaning of the title through the above translated portion of the author's introduction.

THE TREATISES: THEIR NUMBER, SEQUENCE AND CONTENT

Al-Tasrif is characterized by an encyclopedic nature and outlook. It embraces a wide range of topics touching the various branches of the health field known and developed at the time. Some novel features will be discussed later.

Many translators and medical historians have presented inaccurately the number³⁾ and the sequence⁴⁾ of the treatises in

¹⁾ See, for example, Fielding H. Garrison, *An Introduction to the History of Medicine* (4th ed. rev., Philadelphia, 1929), 131-2; Ralph H. Major, *A History of Medicine* (Springfield, Ill., 1954), 250; and Heinrich Haeser, *Lehrbuch der Geschichte der Medizin und der epidemischen Krankheiten* (vol. 1, Jena, 1875), 578.

²⁾ Madr. 5007, fol. 1 b.

³⁾ For example, Johannes Freind, in *The History of Physick* (vol. 2,

and compounded drugs are administered. It starts almost where the seventh category ends, for here we have the drugs from mineral, plant, and animal sources already at hand for compounding according to the prescribed formulas.

The first three treatises in this category in many respects link together, but show differences. For example, the third treatise, which is the first in this category, concerns aged confections that are to be fermented and stored. Al-Zahrāwī commends the good reputation of this form of medication throughout the ages. These preparations, he declares, were used by the ancients over and over again, and found of great value.¹⁾ Kings and rulers kept them in their drug cabinets to be used when need arose. Al-Zahrāwī confesses here that he is compiling what he finds most useful out of many writings. He compares various manuscripts to be sure that he is copying the most accurate ones, since these preparations are to be stored for a long time, and if they are not compounded right, they deteriorate.

The same procedure was followed in the fourth treatise on theriacs. Here al-Zahrāwī begins with an elaborate discussion of the so-called "great theriac" (الثرياق الكبير), which was referred to in Arabic as "al-Fārūq" (الفاروق) because it distinguishes this type of preparation from similar confections. After comparing several manuscripts, al-Zahrāwī set down his modified formula, with a procedure in seven stages to prepare the honey as a vehicle, grind the weighed dry ingredients, cook and strain the liquids, and compound all the constituents together in the right proportions. The end product contained no less than eighty-four kinds of drugs, such as honey, psyllium, opium, black pepper, cinnamon, glycyrrhiza, safran, rhubarb, the flesh of vipers, ginger, balm and agaric.²⁾ Therefore, if we were to consider these drugs in the light of their active constituents known in pharmacy at present, they would run up to the hundreds. Since the original purpose of the "theriacs" was as antidotes against various types of poisoning, al-Zahrāwī devotes the last portion of the text to this subject.

In the fifth treatise we learn of the newly prepared and the aged

¹⁾ Taym., fol. 127 b.

²⁾ Taym., 133 b.-134 b.

"hieras" (الهيراس),¹⁾ including the fermenting process and storage requirements. Here al-Zahrāwī suggests the month of May, when medicinal plants reach ripeness, as the best time of the year in Spain for preparing the "big Hieras." These preparations differ from the previously mentioned confections in containing bitter drugs, such as colocynth and aloes. Due to the esteem in which certain hieras, such as the famous "hiera picra" (the sacred bitters) were held, their use persisted from antiquity to the nineteenth century.²⁾

The multiplicity of simples contained in the individual formulas—following the trend of the time—shows the author's tendency to promote polypharmacy. However, in simpler form, these types of medication were known in classical writings. Paulus, relying particularly on Galen's work, *De antidotis* (with certain modifications), gives an intelligent explanation of the subject. He divides the antidotes into three kinds: those used against deleterious substances; those against venomous animals; and those to counteract food poisoning. The theriacs, then, are useful antidotes in all three types of poisoning.³⁾

But al-Majūsi's treatment of the subject perhaps appeals more to modern thought. He first considers the factors involved in the "capability" of antidotes to inactivate poisons or make them harmless and the means by which they rid the body of them. Second, he tries to find out why a theriac acts as it does, how to detect its effectiveness, and the ways to determine the proper dose in the various diseases. Third and last, al-Majūsi discusses the toxicity, symptoms, and treatment of over-doses of certain simples, such as hyoscyamus, digitalis, and aconite, if taken internally⁴⁾—an interesting forerunner of modern pharmaco-toxicology.

The seventh treatise covers additional forms of pharmaceutical preparations: enemas, pessaries, and rectal and vaginal suppositories. With each formula, as in other treatises of *al-Tasrif*, the

¹⁾ The Arabic word "iyārij," derived from the Greek, means the bitter medicine (Taym., fol. 140 a.).

²⁾ Arthur Osol, George E. Farrar, et al., *The Dispensatory of the U.S.A.*, (25th ed., Part 2, Philadelphia, 1955), 1613.

³⁾ Paulus, *Seven Books*, tr. by Adams, 3: 510-525.

⁴⁾ Al-Majūsi, *al-Maliki*, 2: 97, 226-233, 526-550.

therapeutic uses of these forms of medications are listed. The text, moreover, contains a few sections on emetic drugs. It overlaps the category of therapy and pharmacology, because these emetic drugs are studied in the light of their effects on the human body. Al-Zahrāwī discusses inducing emesis to get rid of, first, extra yellow bile, second, black bile, and third, phlegm. Drugs that cause vomiting of blood, the fourth humor, are dismissed as hazardous.

This topic had been treated in a comparable way by Paulus, although the forms and number of recipes were less comprehensive than those al-Zahrāwī presents. In the chapter "On Emetics, and the Mode of Administering Hellebore,"¹⁾ Paulus seems to have influenced al-Zahrāwī, who nevertheless goes beyond Paulus in the use of many emetics other than hellebore. The presentation of these topics by al-Majūsī adds nothing of significance.

Tryphera, Electuaries, Syrups and Robs

Here we discuss three treatises concerned with forms of pharmaceutical preparations for internal use. We start with the tenth

treatise on the properties of tryphera (خواص الاطریفادات²⁾) and cathartic nuts. Again al-Zahrāwī refers to various compendiums and medical works he consulted in collecting his material. The text ends with a section dealing with preparations made of seeds and nuts, mainly to induce laxative action or to treat stomach-ache. This section overlaps previously discussed topics.

The next treatise, the eleventh, discusses the properties of electuaries (خواص الجورنات³⁾), cumins and similar paste-like medications. The author praises them highly as useful both in keeping healthy people well and in restoring health to the sick. The last

¹⁾ Paulus, *Seven Books*, tr. Adams, 3: 503-506.

²⁾ The tryphera is another type of confection in dough form, but its basic constituents are the three medicinally famous myrobalans (الاميلجات): the chebula, the emblic, and the belleric. Later on, other kinds of myrobalan species were added. Sahlān Ibn Kaysān, and Rašīd al-Dīn Abū Ḥulayqā, *Deux traités médicaux*, tr. and ed. by Paul Sbath, and Christo D. Avierinos (Cairo, 1953), 45.

³⁾ Electuaries as a term derives from the Persian language, meaning "food digestives." Basically they are medicinal confections like the tryphera, but the major ingredients are certain aromatic spices, the three kinds of peppers, and ginger (*Ibid.*, p. 47).

section of the text deals with the usual technique used in blending the principal spices with other drugs in forming the different liquefies.¹⁾

Of interest to the pharmacist is the thirteenth treatise on some delightful syrups and the manufacture of robs from various fruits. An example of the latter preparations is the making of grape robs. Ripe grapes are cleaned well and pressed gently. The juice is then strained into a new earthenware vessel, covered with water, and left to stand for three days. Later on, the contents of the vessel are cooked on a gentle fire until three-fourths is evaporated. The resulting grape rob is cooled and stored for future use.²⁾ The methods used in preparing other robs are also skillfully and vividly recorded. The robs were recommended as vehicles to blend other drugs with, replacing the use of honey or sugar syrups. The last section presents methods of preparing syrups containing condiments and aromatic spices, and their properties.

These elaborate pharmaceutical preparations have no equivalent counterpart in the earlier work of Paulus. Al-Majūsi covers similar ground,³⁾ but compared with his contemporary al-Zahrāwi, he is less comprehensive in describing the technique involved and in presenting formulas for various medical uses.

Now we turn to the fourteenth treatise concerning the ordinary decoctions and infusions, and the strong, aromated ones. Basically these preparations were designed to purge the excess of humors, although other therapeutic suggestions were mentioned as well. Certain decoctions were made in the form of a broth or thick soup to be taken on an empty stomach. Other types were to be mixed later with aromatic spices for varied therapeutic effects. Due to the nature of these preparations, the author recommends dispensing them within a short time for fear of deterioration.

Especially of interest to the profession of pharmacy is the fifteenth treatise. It discusses the properties and methods for the manufacturing of conserves made of fruits and flowers and either dry or newly harvested medicinal plants. Al-Zahrāwi emphasizes here that the art of manufacturing conserves depends more on personal

¹⁾ Taym., fols. 177 a-179 b.

²⁾ Taym., fol. 192 b.

³⁾ Al-Majūsi, *al-Maliki*, 2: 572-578, 588-593.

experience and close observation through practical training than on theoretical studies.¹⁾

The author then divides the text into two sections. The first deals with "cold conserves," such as those made of the rose, violet, apple, quince, cucumber, and nenuphar (water lily). The second embraces the "hot conserves," referring to the quality of their "powers," such as peppers, cocoanuts, carrots, and garlic. In certain cases the author mentions more than one method of preparation, as in the conserve of roses. Here, as in the previous three treatises, detailed instructions are introduced concerning methods to be used in adding the aromatic spices and their therapeutic uses.²⁾

In comparing the previous treatises with their predecessors we see in general that forms of medication such as robs, conserves, and the like, probably were not known to the Greco-Roman world.³⁾ Thus, Paulus discussed neither the methods of preparing these forms nor their medicinal uses. Al-Majūsi does mention them, giving a few examples in each case. Yet, he treats them as a physician, more interested in the therapeutic application and effects of a drug than in technical questions about the form of medication. But al-Zahrāwī is interested in both the improvement and perfection of the pharmaceutical preparations as well as in the treatment of his patient.

Powders and Tablets

Because of the importance of powders and tablets or troches as closely linked forms of medication, it seems appropriate to discuss them jointly. The author compares them in an interesting way. He considers powders (which are discussed in the sixteenth treatise) less stable than tablets (seventeenth treatise) because they have more surface area exposed to the air. The penetration of air into the powders hastens the time of their deterioration. In making tablets, the addition of gums (he used mainly acacia and tragacanth) preserves them as honey preserves confections.⁴⁾ Al-Zahrāwī

¹⁾ Tub. 782, fols. 1a-2 a.

²⁾ Tub. 782, fol. 13 b.

³⁾ Edward Kremers and George Urdang, *History of Pharmacy* (2nd ed., Philadelphia, 1951), 35.

⁴⁾ Par. 5772, fol. 1 a.

considers the lack of such preserving agents in powders as one disadvantage. Thus he recommends bulk storage of powders in narrow-mouthed containers to be kept tightly closed, preventing air penetration until the time of use.

Al-Zahrāwī advocates the therapeutic advantage of powders for their drying qualities. They are to be used, according to the author, for drying the excess humidity in the humors, associated with such conditions as diarrhea, frequent urination, cystitis, and hydronephrosis as now known.

Tablets, the author adds, are more useful, and easier to use in travel or at home. They can be administered easily to those who dislike the bitter taste of powders, whether used for laxative or astringent effect.¹⁾

Powder did not receive much attention in the work of Paulus, and al-Majūsī presents only a few, commonly used formulas in Arabic medicine,²⁾ but tablets or troches are elaborated upon by both. We present one formula encountered in all three works, as a comparative example. Our casual choice should not be taken as representative of the entire works of these men, but only as a sample to throw some light on similarities as well as differences in approach on this point. Here is the formula, which contains roses as a major ingredient and hence is known as the rose tablets:

Paulus

"*The trochisk from roses.*—Of acacia, of gum, of the flower of roses, of pomegranate flowers, of the juice of hypocistis, of gall, of each, dr. iij; of the juice of green roses, of the seed of plantain, of each, dr. j; of Indian buckthorn, dr. j."³⁾

al-Majūsī

"*Prescription of rose troches.*—Which is useful in stomach-ache and fevers caused by excess of phlegm. Take red rose dr. vi; the root of the glycyrrhiza, dr. iv; nard dr. i; grind, sift and knead [them together] and [make] into tablets. [weight of each], dr. i.⁴⁾

al-Zahrāwī

"*Prescription of rose troches*—Which is useful against [excess]

¹⁾ Tub. 782, fol. 40.

²⁾ Al-Majūsī, *al-Maliki*, 2: 578-580.

³⁾ Paulus, *Seven Books*, tr. by Adams, 3: 530.

⁴⁾ Al-Majūsī, *al-Maliki*, 2: 570 (S. H. translation).

of blood in the stomach and the ailments thereof caused from the pouring in of yellow bile. Take of the red rose flowers, dr. iii; the root of the glycyrrhiza, whose top parts are removed, dr. ii; the root of the red sandal wood, barberry bark, melilot, of red sandal wood, yellow sandal wood, mastic, spikenard, yellow each, dr. i; the pulp of the melon seeds, white chalk, Persian amber, white tragacanth, of each, dr. i; grind the drugs, sift and manna, of each, dr. ii; safran, dr. i; grind the drugs, sift and knead them together in dandelion water. Make them into tablets, the weight of each tablet dr. i. The dosage is one tablet to be taken with Oz. 4 of dandelion or black morel.¹⁾

In viewing this sample, one sees that the brief presentation of Paulus—modified from earlier classical writings—has been added to and therapeutically reinforced by al-Majūsī, and was elaborated still more by al-Zahrāwī, who included new simples to increase its therapeutic uses and offered a fuller explanation of technique and method of administration.

The wide scope of pharmaceutical forms used by al-Zahrāwī becomes still more obvious in the eighteenth and following treatises. Here, for example, the text discusses the following additional types of preparations: the sternutatories,²⁾ fumigations to kill lice, mice and undesired insects; incenses; effervescents; ear drops (including the squeezed juice of onions); gargles; and fine powders for spraying on wounds, to stop hemorrhage of the nose or in circumcision.³⁾

The next treatise, the nineteenth, represents al-Zahrāwī in a new guise, that of a cosmetologist concerned with beautifying preparations of all kinds. He divides the text into two major parts of ten sections each. The first part deals with such topics as manufacturing perfumes; mixing spices; distillation of aromatic waters (including safran, sandal wood, and rose waters)⁴⁾ and the apparatus used;⁵⁾ anointing oils, in which aromatic spices were incorporated; and

¹⁾ Par. 5772, fol. 23 a. (S.H. translation).

²⁾ The sternutatories actually do not constitute a type of pharmaceutical preparation, inasmuch as the term refers to pharmacologic action.

³⁾ Par. 5772, fol. 31 a.

⁴⁾ The description by al-Zahrāwī of the processes of distillation and calcination, and their importance, has been discussed by Forbes, *Distillation*, 30, 40-41.

⁵⁾ Apparently the apparatus for distilling aromatic waters used by al-Zahrāwī was an improvement upon that used by the Greeks. See Edward O. von Lippmann, *Abhandlungen und Vorträge zur Geschichte der Naturwissenschaften* (vol. 2, Leipzig, 1913), 208.

"al-ghawālī,"¹⁾ which were products of the principal spices and condiments, processed in a special way for medicinal or beautifying purposes. The second part discusses beautifying medications and techniques, and the manufacture of skin and hand lotions, deodorants, dermatologic pharmaceuticals, and hair preparations such as dyes, tonics, removers and curling lotion. These remind us that today we do not have many novelties either in the range of cosmetic practices or in the mindfulness of seeking their improvement.

The twentieth treatise discusses collyria, eye-salves, lotions and eye compresses, especially in the light of their therapeutic and pharmacologic effects. This somewhat overlaps the fifth category. Of pharmaceutical interest is the fact that rose water and gum Arabic (acacia) were among the ingredients mentioned in certain formulas for collyria.

Paulus had presented an interesting study "On Collyria", stating that "the materials from which ophthalmic medicines are composed are various" and then going on to describe them with clarity and orderliness.²⁾ But we see his interpretations are not as elaborate as those of al-Zahrāwī if we look, for example, at the chapters devoted to fumigations or to perfumes and beautifying agents.³⁾

Al-Majūsī organizes his material by designating a chapter for each of the following topics: collyria; eye-salves; fine powders for spraying on wounds or for nose bleeding; and dermatologic prescriptions;⁴⁾ plus a brief chapter on beautifying preparations.⁵⁾ But there is no detailed mention of distillation of aromatic waters or other pharmaceutical techniques of the type we find in *al-Taṣrif*.

The last two treatises in this large category are the twenty-fourth on ointments and the twenty-fifth on the "adhān". In discussing ointments al-Zahrāwī states that while dressings and poultices are used in the various modes of treatment, ointments are recommended specifically for application on wounds, external sores, blains, ulcers

¹⁾ These are not alcoholic preparations—which were not then known to the Arabs (Julius Ruska, "Ein neuer Beitrag zur Geschichte des Alkohols," in *Der Islam*, 4 (1913), 320-4), as Forbes also agrees.

²⁾ Paulus, *Seven Books*, tr. by Adams, 3: 548-556.

³⁾ *Ibid.*, 599-600.

⁴⁾ Al-Majūsī, *al-Maliki*, 2: 595-603.

⁵⁾ *Ibid.*, 77-80.

and blisters. He divides ointments into two types in accordance with their effect upon the ailing organ, either to loosen or to tighten it. These two types are again subdivided—in relation to the kind of medication they hold—into mild emollients, for treatment of children and women, and potent and astringent ointments, for use by men.

Al-Zahrāwī first mentions the renowned "Palm Ointment" (المرهم النخل), attributed to Galen, but presented here after much modification. He makes it clear at the outset of the text that his material is copied with modifications from the works of Galen, al-Rāzī, Sābūr ibn Sahl, and many other writers.

As ointment bases he uses hog lard, fowl and animal fats,¹⁾ and other substances. Heat of gentle fire is occasionally to be employed, depending upon the nature of the ointment being prepared.

To judge the quality of prepared ointments, al-Zahrāwī relies upon organoleptic methods. For example, he says that a good ointment will give forth the odor of the aromatic ingredients. If it does not, that ointment should be discarded.²⁾

The twenty-fifth treatise presents a facet of particular pharmaceutical interest, although it too has been neglected in past research on *al-Tasrif*. It merits more historical attention and careful evaluation, a task we undertake in the following chapter.

¹⁾ Wien 211, fols. 1 a-4 b.

²⁾ Wien 211, 14 a-16 b.

CHAPTER SIX

THE TREATISE ON THE "ADHĀN": EXCERPTS AND COMMENTARY

A PRELIMINARY ASSESSMENT OF MANUSCRIPT FILIATION

The twenty-fifth treatise on the "adhān" has been studied from four manuscripts (as microfilm).¹⁾ They are Besir 502 (dated 1496 A.D.), Sehit (dated 1535), Wien 211 (dated 1617), and Besir 503 (dated 1703). These manuscripts are hereafter abbreviated as B2, S, W, and B3, respectively. They have been examined to detect any genealogic relationships.

Comparing manuscript B2 with W we find differences in the number of lines in each page, differences in some technical words and occasionally in word order. These variations make filiation between the two highly unlikely.

However, B3 agrees with B2 in the number of lines in each page and the use of vowel points, and word order, where W does not. B3 differs from B2 in certain word expressions and in verb and pronoun inconsistencies. The phrases or lines omitted by the scribe who wrote B2 are retained in both B3 and W, which were copied much later.

S agrees with B2 in more respects than any of the rest, but the two are not alike in ways that would suggest that S was copied from B2. B2 and S might have been copied from two manuscripts that possibly have a common ancestor, inasmuch as the common error known as "omissio ex homoeoteleuto" is encountered here. As the footnotes show later on, there are phrases overlooked in B2 that are found in the S manuscript written later.

¹⁾ Despite repeated attempts, we were not able to arrange for the photo-copying of the Bankipore manuscript No. 16 until after the present study had long since been completed. This manuscript, too, contains the twenty-fifth treatise. I examined briefly the recently received microfilm. There is nothing of special significance in way of content or variation from the other four manuscripts to alter any part of the reconstructed text, notations, or comments (S.H.).

None of the four manuscripts seems to have been copied from one of the others; and it is doubtful that any two had an immediate common ancestor. The four texts at hand therefore will be assumed independent for purposes of reconstructing the excerpts of the text presented, translated, and commented upon below. The footnotes give variants, reasons for preferring a given reading when not obvious, and explanatory remarks.

APPROACH AND PURPOSE

As al-Zahrāwī launched upon the writing of the twenty-fifth treatise he emphasized its importance as a part of *al-Tasrif*. He stated in the preface, in pointing out his approach and purpose, "I set apart this treatise on the 'adhān', their uses, properties, the various ways of manufacturing and the methods of their utilization. Know then that the benefits of the 'adhān' in medical practice as well as in the treatment of diseases are great. The honorable ancients¹⁾ used them in the treatment of diseases externally by rubbing like a liniment, or internally by drinking."

By "al-adhān", al-Zahrāwī means the fatness or oily essence that could be extracted from certain substances by pharmaceutical processes. Examples of such substances are olives, wheat, sesame, linseed, and even eggs. The extracted fatness, al-Zahrāwī believed, is the vital constituent for medicinal use; and in the singular it is called "duhn", and in the plural, "adhān." In referring to this class of pharmaceutical products, hereafter, these two transliterated words will be used, both for accuracy and convenience.

Al-Zahrāwī divides the text on the "adhān" into two major parts, and goes on to say: "[The first part concerns] the 'adhān' that function through a characteristic power in them without being mixed with other drugs; while the [second] part concerns the action of the 'adhān' with which other drugs are mixed. These drugs in turn could be simple and single or compound and diverse."

Then the author lists several "adhān" that are useful in medicine due to "power inherent" in them, such as [olive] oil, sesame, amygdalin, linseed, peach, radish, walnut, hazelnuts, wheat, henbane

¹⁾ The word (أَعْرَافٌ) undoubtedly here refers to physicians.

(*hyoscyamus*),¹⁾ and the like. Besides, he mentions a number of simples that are to be mixed with the "adhān" for promoting the latter's therapeutic uses, such as rose, violet, jasmine, lily of the valley, clove, cardamom, dill, thyme, and spikenard.

For convenience we have organized our discussion of the "adhān" into three types of information: Pharmaceutical technology, therapeutic uses of the "adhān", and the compounded drugs that blend with them. In each category we present samples of the reconstructed text, an English translation, and comments on various pharmaceutical aspects.

PHARMACEUTICAL TECHNOLOGY

In the pharmaceutical technique employed by al-Zahrāwī we include extraction of the "adhān," the equipment he used, his accuracy in describing the various processes, and his general approach. The samples we choose from the text present a first hand look at the man, his mode of expression, his style and precision, and his way of reasoning. The excerpts are intended to offer a representative picture of the whole text. A look at the list of the "adhān" included shows the wide scope of this treatise. In a manuscript like B3—which is written in a medium sized Arabic script—the text occupies 21 folios (f. 495b. through f. 516b.).

In the list below, the italicized titles signify those "adhān" for which the respective sections are later translated and commented upon: *olive oil* (including "*al-infāq*" and *al-rikābī*" oils), *sesame*, *bitter and sweet almond*, *poppy*, *linseed*, *mezereon* (wild pepper), *castor-oil seed*, *lentisk*, *carthamus*, *radish*, *mustard*, *walnut*, *hazelnut*, *pistachio*, *plum*, *apricot*, *hemp*, *laurel*, *nigella* (*black cumin*), *nettle*, *wheat*, *darnel*, *chick-peas*, *henbane*, *eggs*, *snakes*, *pumpkin*, *melon*,

snake cucumber, cucumber, *ben*, *balm*, *laurus* (bay laurel لارس) or probably (لارس butter ?), *naphtha*, *coaltar*, *red brick*, *flying ants*, *rose*, *violet*, *jasmine*, *eglantine*, *water lily*, *lily of the valley*, *clove*, *narcissus*, *myrtle*, *wild pomegranate blossoms*, *wild camomile* (*daisy*), *buphthalmum* (of the thistle family, *Carduaceae*), *camomile*, *dill*, *bryony*, *thyme*, *orange*, *rue*, *chicory*, *thorn* (*Tribule terrestre*).

¹⁾ It seems from the discussion in the text (W, f. 23a and B2, f. 395a) that al-Zahrāwī used *Hyoscyamus alba* and not *nigra*.

THE TREATISE ON THE "ADHĀN"

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prickly genista, wormwood, palm spathe, henna flower, *grand basil*, *emblic*, *daphne laureola*, marjoram (*wild mint*), sweet basil, mastic, germander, basilic clove, melissa, styrax, citron, quince, costus, cucumber, cuphorbia, oleander, lichen, eupatory, spikenard, aloes, fenugreek, myrobalan, purging cassia, pepperwort, ambergris, Indian "duhn", a "duhn" prescribed for the heat of the stomach, for moving the bowels, for scabies, for hair removal, for rubbing as a liniment, for consumption, for hair tonic, for coughing (copied from Ibn al-Jazzār), for hair dye, colocynth (compounded "duhn"), camomile (compounded "duhn" copied from Ibn Māsawayh), and a "duhn" prescribed by Tylūn (an ancient physician).

There is one point to be added in regard to the arrangement we have imposed upon the translated part of this treatise. Usually, al-Zahrāwī presents his discussion of each "duhn" by stating its therapeutic usage first and then how it is prepared. Because of our pharmaceutical inclination and for a more logical arrangement, we preferred to reverse the author's order by translating and commenting, first, upon the methods of manufacturing the "adhān" and, second, their medicinal uses.

Let us start with the "foremost and most abundant of the "adhān," according to al-Zahrāwī, the olive oil, "al-zayt" (الزيت).

THE RECONSTRUCTED ARABIC TEXT
OF EXCERPTS FROM THE 25 TH TREATISE
(see page 98 for English translation)

الزيت : - قد يختلف في قوته وطبيعته ومفعوله من وجوه كثيرة وذلك انه قد يكون حديثا او متيقا ويكون متوسطا بين ذلك وقد يكون من زيتون قد ملح بالمالح ويكون من زيتون قد خالله الورق ويكون من زيتون قد طُبِّر في الطامير ويُعْنَى ويكون منه ما استخرج باللأ العذب ومنه من زيتون قد يبس في الشمس حتى ^{١٠} ذُخت مابه وادحر ^{١١} منه ما استخرج بالعصار من غير ما ومه ^{١٢} ما استخرج بالثار وقد يختلف الزيت ايضا من قبل البلدان والارضين فذلك يلحقه التفاوت في قوته وطبيعته ومفعوله ومضره واما الزيت ^{١٣} الذي يستخرج من زيتون اخضر ^{١٤} غض لم يكن نضجه فان اليونانيين تسميه زيت الانفاق كانوا زعم دیاسقوريدس ان الزيت الانفاق يوناق ومحن نسي هذا الزيت بزيت الـ الدهن الركابي ^{١٥} . - وقد يفضل الزيت على هذه الصفة حتى يفلخ عنه لونه وتذهب رائحته ويسى جينة الدهن الركابي وانما سمي بذلك لانه ركاب لكل ما يصرف فيه ويعمل عليه وهو ان تأخذ الزيت الحديث الطيب الرايحه اللزيم الطعام الذى لا يغلب عليه كيفية ظاهره ولا قوله يسمى فيوض في القصارى للشمس ويلقى عليه الماء العذب ثم يرفع بالاصداف ويبدل له الماء كل يوم يفعل ذلك داعما حتى يبخر وينفلخ من لونه ثم يترك حتى يطفو الزيت في اعلا الماء ويجمع ورفع هنا اذا كنت في بلد ليس فيه زجاج .

واما غسله بالزجاج فهو اتقن وأذهب بان يستعمل مغسل من زجاج ^{١٦} ببلدين الواحد اشيق من الاخرى الواسعه في اعلاها والضيق في اسفلها ويكون محملها رطلين او ثلاثة ارطال الواسعه بقدر ما يسدلها ايهما مل وضيقه ما يدخلها الميل ثم تكتب فيها الزيت ولما السخن ثم ضع ايهما مل على الفم واصبعك على الثقب وتضرره ضربا جيدا ولا يكون المغسل ملوا نسا ^{١٧} بل يكون مثل ثلثيه ويترك للشمس ساعة حتى يطفو الزيت على الماء ويكون في الثقب الذى في اسفله قطعه فاذما طفى الزيت على الماء نازعقطنه واترك جاريما حتى يذهب الماء فلا يزال يفعل كذلك حتى يبضم وينفلخ من لونه ورائحته .

a) missing S b) missing B₂ c) B₃ و ما d) missing W

(صف) e) missing S f) missing S g) We omitted the word "sifah" (صف) S الزيتون h) missing B₃ because the meaning is sufficiently clear without its repetition. It is not always encountered with each "duhn" in the text. i) missing B₂

دهن اللوز المز . - وأما استخراج دهنه فهو على هذه الصفة وهو أن تأخذ من اللوز
المرطلاً^{a)} فتصفيه وتحفظه وتذقه دقاً جيداً حتى يصير كالدجاج في حارن من خشب قد صبَّ
عليه قدر نصف أوقية من ما مثلث ثم اعركه بيدك عركاً جيداً فأنك رأيت الدهن قد
خرج من بين أصابعك والا فتربيه الماء المثلث قليلاً حتى ترى الدهن خارجاً واياك أن
تربيه من الماء فوق القدر فتصير اللوز شيئاً يا للين ويفسد ولا يخرج الدهن ثم أصصره بيدك
ن خضاره نظيفه فإذا بدا يخرج الدهن من بين أصابعك اجمعه برفق وارفعه ثم صبَّ على
عصاره^{b)} الآية ما مثل أيضاً قليلاً ثم دعه حتى يشربه افضل به كما فعلت اولاً حتى
يخرج الدهن اجمع ومقدار الدهن الذي يخرج منه الزيت وان استفسر خرج منه الثالث
وايضاً على قدر دهنية اللوز فقد يختلف اللوز على حسب البلدان وقدم اللوز وطراوته .

دهن الغار . - صناعة دهنه معروفة راكث ما يجعله البنا هذا الدهن من الغرب نحو بي^{c)}
وهذا يصنع لكتورة وجود شجره وذلك ان يوضع حب الغار بعد تناهى نضجه فيدق جه
ويجعل في قدر ويصب عليه من الماء اكثـر من غـره بكثير ثم يطـبخ حتى يظهر دهـنه على
الماء ثم يجـعـع الـدـهـن بـرـفـق وـيـكـون طـبـخـه بـنـارـ لـيه وـتـهـ يـعـذـد عـلـيـهـ غيرـ هـذـهـ الصـفـهـ وهوـ انـ يـوـخذـ منـ زـيـرـتـ الرـكـابـ خـةـ أـفـاطـ ومنـ حـبـ الغـارـ رـطـلـ فيـدقـ وـيـطـبخـ باـلـزـيـرـتـ نـعـماـ
ويـصـرـ ويـسـخـرـ ويـرـفعـ .

دهن القمع . - صفة استخراج دهنه على هذه الصفة وهو أن تجعل حنطه تقبـيـ في بـطـنـ
زـيـاجـ قد طـيـنـ بـطـيـنـ الحـكـهـ وـيـلـقـمـ فـمـ الزـيـاجـهـ بـلـيـفـ قد صـنـعـ منـ خـيوـطـ الصـفـرـ النـقـانـ
لـقـومـ فـيـ حـلـ الزـيـاجـهـ وـيـمـنـعـ المـنـطـهـ انـ تـخـرـجـ منـ الزـيـاجـهـ اذاـ اـكـبـتـ وـيـعـظـلـ كـاتـبـهـ
وـيـتـبـ منـ وـسـطـهـ وـتـكـيسـ^{d)} فـيـ الزـيـاجـهـ وـتـخـرـجـ رـاسـهاـ إـلـىـ اـسـفلـ وـيـوـضـعـ يـاـزاـ فـمـ الزـيـاجـهـ
شـيـ^{e)} يـقـطـرـ فـيـهـ ماـ يـسـيلـ مـنـ المـنـطـهـ وـيـلـقـيـ حـولـ الزـيـاجـهـ بـرـقـينـ يـاـ بـسـ وـيـشـعلـ فـيـهـ
الـنـارـ فـانـ الـدـهـنـ يـقـطـرـ وـيـرـفعـ وـيـسـعـلـ عـلـيـهـ مـاـ وـصـفـنـاـ فـانـ عـجـيبـ .

وـتـهـ يـصـنـعـ عـلـيـهـ غـيرـ هـذـهـ الصـفـهـ وهوـ انـ يـوـخذـ القـمعـ وـيـوـضـعـ عـلـيـهـ رـخـامـهـ وـيـحـسـيـ حـفـيـدـهـ
حـدـيدـ غـلـيـظـهـ وـتـوـضـعـ عـلـيـهـ القـمعـ فـانـ الـدـهـنـ يـخـرـجـ فـيـجـعـ بـرـفـقـ وـهـذـاـ الصـرـبـ منـ اـسـتـخـراـجـهـ
نـهـ اـعـتـادـ الـلـهـادـونـ عـنـدـنـاـ اـسـتـخـراـجـهـ .

بحـرـبـيـهـ (c) a) بـطـلـلـانـ b) missing W to the end of the paragraph. e) بـحـرـبـيـهـ
B₃, S d) بـلـبـسـ

دهن الخروع^{a)}. - استخراج دهنه على هذه الصفة يوخذ حب المخروع المطحون في ماء
بيشس فإذا انشق من قشره وتساقط ناجح ما في داخله وصبره في هارن ودنه دقا ناعما
ثم امرجه في قدر الزيت^{b)} وسب عليه الماء ثم اغله فإذا خرج دهنه كله ازالت القدر من
النار وحيث التبن كله بصرف ورفته إلى وقت الحاجة . وقد يستخرج على حسب ما
يستخرج دهن اللوز الا انه يملاج الى حدٍ ولطف لاه سُرْغَى المديدة^{c)}.

دهن الغرول. - صفة استخراج دهنه هو ان يوخذ فيدق دقا ناعما ثم يمسح في ما
حار ويخلط به شئ من زيت ويعصر في متبل صفيق ويرفع .

دهن القigel. - صناعة استخراج دهنه معرفه يستخرجه الدمانون كثيرا بمحرر وبكترونة
يوقدرنه في الصابع بدلا من الزيت .

دهن الشونيز. - صناعه دهنه على هذه الصفة يوخذ من الشونيز رطان^{d)} فيوضع على
طباق ويقل^{e)} حتى يتتفتح^{f)} ثم تتركه حتى يبرد ثم تمسكه حتى يعود كالخ ثم تأخذ
من ما قد انتفع فيه حلبة يوما وليله بعد ان تصنفه عن الملبه ويصله في قدر واسعه فإذا
محن فاجعل الشونيز عليه ثم اغله عليه او غليتين ثم ازله عن النار والقط الدهن يكتفى
برفق وصبره في قارورة وارفعه لوقت الحاجة .

دهن الحمص. - يوخذ الحمص فيطعن جريشا ويوجذ قدر فيجعل فيها الحمص ويربط
فيها بخفره ويوجذ قدر اخر قارغه يكون فيها اوسع من القدر التي فيها الحمص ثم تكتب^{g)}
على القدر الذي فيها الحمص ليقع له داخل قدر القارغ ويطحن جميعها وتحفر حفرة
تدخل القارغه فيها وتبقى الا ما بالحمص خارجا ويحمل عليها ثارا ليه حتى يعرق الحمص
ويخرج دهنه ويسهل في القدر القارغه ان شاء الله تعالى .

دهن البيض. - استخراج دهنه على هذه الصفة وهو ان تأخذ من البيض عشره بيضات
وتسلق ثم تقشر ويجعل في مفرقه حديد وتوضع المفرفه على نار حمر حتى يحرق البيض وينخرج
 منه دهنه ويصير للح^{h)} فتحه ويرفع في زجاجه وقد يستخرج ايضا على هذه الصفة على

a) The whole paragraph on mustard is missing W, only the title is inserted
b) المبهر c) B₂, S d) missing B₂
in margin fol. 25 b. e) B₂ not clear f) الى g) the phrase is repeated S h) B₂
الدخن i) W يتعفع j) ويقل عليه k) دهن البيض

يأصبه في بعض النسخ وذكر فيه انه ينفع من جميع اوجاع المعدة كلها وكل وجع لا يعرف ما هو وهو علاج محرب يعين على الجigel ويصلح الاردام للولد . يوخذ اليه ريطخ كا هو ثم يستخرج المح^a الا صفرته اذا طبخ ثم تمرته وتصره في خرقه ييفا به لا يجالله شيء سواه^b ثم تجعل قدرًا جديده منصفه بما عذب فإذا سخن علقت المح المربوط في الخرقه على الماء في عود مفترض على فم القدر من غير ان تمس الخرقه الا اذا نالتها حرارة الماء لانت فتخرجها وترسها برق وتصصرها ثانه ينضر ويخرج زيتها قبيحه في انا زجاج ورفعه فهو محرب .

دهن البستان . - لما استخراج دهنه فهو ان يشرط نضبان البستان بشرط فيصله الدهن ويعجم . وذكر بعض المكاك انه يوجد بعد طلوع كلب الجبار وهذا البستان الذي منه هذا الدهن اما مثنته خاصة بارض مصر في مرض من اعراضها يسمى عين شمس ، النفط . - صنفان صناعي ومخلوق فالمخلوق منه يخرج من عيون اسود من تن الرايحه ثم يصد فيبيض واما الصناعي فيقصد من ادهان وهما جهينا مستعملان وهما حاران في الدرج الرابه فيما قوى جاذبه للنار .

دهن الحيات . - صفة استخراج دهنه هو ان يوخذ من دهن البريج ثلاثة اقسام تنصير في فخاره ويلقى عليها من الحيات السود ما بين خمسة الى عشره على قدر ما تكون الحيات من الكبر والصغر ويدرس راس الفخاره ويطبخ بنار لينه ويترك عن النار ويترك حتى يبرد قليلا ويفتح راسها ويأخذ من بخارها وترك حتى تبرد وينذهب عنها البخار وتصفي وتصير في إناء وستعمل فيما وصفنا بين يطل برأسه فان رأى انه يوشيه امسك عنه ثم عارده حتى يبرا ان شاء الله تعالى .

ونه يستخرج^c من دهنه على غير هذه الصفة وهو ان يلقى في الماء المنيل ويطبخ حتى يهرا ثم يلقط الدهن من على الماء ثم يرفع فإذا احتج اليه خلط الدهن بش من سيرج ويستعمل فهو اقوى في ذلك ان شاء الله تعالى .

دهن النمل الطيار . - يوخذ من النمل الطيار الف نمله وتنقع في دجل من دهن الزنبق

ويعلق في الشمس الحاره أسبوعين ويدهن ٤ .

a) Partially defective from سواه to the end of the passage b) دهن النفط c) From قدر يستخرج to the end of the passage, including the second method of preparing the "duhn" missing B₂

دهن البنج . - وصفة استخراج دهن هذه الصفة^(٤) وهو ان يوضع من بذر البنج الايض اليابس الحديث فيدق ويُعجن بما حار ثم يُمسى فما جف منه خلطا بالباقى ولا يزال يُفضل به ذلك حتى يسود عليهن ثم يُصهر بمذيل صوف حنف ثم يجمع الدهن برق وتصفع في آنا ويرفع^(٥) .

الادمان المركب من الادوية المفردة

دهن الورد . - دهن الورد ضروري ومساعاته كثيرة ومناقبه يُفضى مختلفه لأن منها قديمه وممتها محدثه والصناعة القديمة التي ذكرها جاليوس والقديما من الحكما ثلاثة ضروري أحدها أن تأخذ من زيت الزيتون المعروف زيت الانفاق أو الزيت المغول المعروف بالركابي وطلا فتصفعه في طرف مزجاج الداخل والخارج ثم تلقي على الرطل اربعه من الورد الغض ويسد^(٦) راس الطرف وتُقلقه في الشمن اربعين يوما فإذا تم له ذلك صفي رفع في الزجاج بهذه الصناعة افضل صناعاته والطف جوهرا واغوص في الاجام .
واما الصناعة الثانية فهو ان تأخذ هذا المقدار يعنيه من الزيت والورد ثم تعلقه في البر حيث لا يمسه الماء وتركه فيه شهرين ثم تخرجه وتصفيه وترفعه فهله الصناعة تبقى فيها رائحة الورد جدا ولكن في جوهر دهنها علاظ بطى السلك في الاجام ليس معه من اللبان والغوص ما للأول .

واما الصناعة الثالثة فهي ان تأخذ هذا المقدار يعنيه الا ان الاتا الذي تضع فيه تعلقه من داخل بالعمل وبعد ذلك تصفع فيه الزيت والورد وتسد^(٧) راس الاتا تماما وتُلتف في قعر الارض وتُقشع التربة عليه ولا يكون في مكان يعيه في الماء او نداره قريبا فتتركه شهرين .

واما صناعه دهن الورد التي استبطتها اهل العراق فعل هذه الصفة يوضع السمسم كما هو غير منتشر في سطح للطلال في ملحقة ويجعل منه طاقة وطاقة ورد ثم يترك يوما وليله ثم ينزع عنه الورد ثم يعاد اليه ورد آخر يُفضل بذلك به مرات حتى يأخذ السمسم قوه الورد ثم يُعزل^(٨) عنه ويُطحون في الطاحون ويُعصر ويرفع دنه وايجده ما اعيد عليه الورد اكثر من ثلاث مرات فما كان دون ذلك ففمه ومتفعته وقوته بحسبه .

B₂ ويشهد (c) B₂ باذن الله ; B₃ added S. B₃ ان شاء الله (b)
 a) missing B₂ b) باذن الله ; B₃ added S. B₃ وتكلد (d) B₂, B₃, W c) يُغزيل (S

وأي الدهن الذي يأتينا من المشرق كله فهو دهن عامي ليس فيه من قوة الورد الإليسير
ثُقُور البرج عليه أغلب لأن الورد لا يعاد عليه الامره او سرتين ومع هذا ايتها ان منه
ولما وثائيا وثالثا الذي يخرج من تحت العصار في اول عصره يخرج وفيما ذكرنا الرايه ثم
يتخرج بعده ^{a)} دون الراس وثالث دونهما ، لأن فيه خلطا وهو اقرب الى ان يكون سيرجا
من ان يكون دهنا لان قوه الورد فيه ضئيفه وهذا الثالث من الدهن يسمى الرجالين ^{b)}
هذا الذي يخرج الى البدان ويفرق في الاصمار وقد كان يصنع عذانا بفرطه دهنا مكررا
عليه الورد غريب لا يفوقه شيء .

وهذه الصناعة من الدهن صناعه لطيفه جدا لان السرم يقبل كيفية الورد ولا يقبل من
شيء شيء في ذلك لطف وصار اغوص في الابدان واسرع نفروذا من سائر صناعاته كلها فن
اراد ان يعود صناعته فليعد عليه الورد خمس مرات الى سبع مرات ثم تأخذ منه الراس
الذي يخرج اولا فتستعمله .

دهن الاس . - اما صناعته فعلى ضربين لان منه ما يعمل من ورقه القص وشه
ما يصل من نواره وهو زهره وذلك ان يوحد منه ثلاثة ^{c)} او افق ويلقى عليها رطل من الدهن
الرگاني ويعلق في الشس اربعين يوما ثم يصفى ويرفع منه ما يربب بالسرم على ما
ومتنا في الورد والبسنج ثم يتعصر ويرفع وهذه الصناعة افضل صناعاته واخص باذ يدخل
في الطيب يصلح للملوك واهل الرفاهيه .

وبه ما يصنع من ورقه وهو على ثلاثة انواع وهو ان يوضع ورق الاس الطرى في鍋 ويعصر
ويحيط بعصارة مثلها من زيت الاتفاق ويطيخ حتى تذهب الصارة ويفقى الدهن .
ومنها ان ^{d)} يطيخ ورق الاس المدقوق في الماء او في الشراب وهو الاصل طبخا جيدا
حتى يقبل الماء قوه ويصفى ويلقى على ذلك الماء مثله زيت الاتفاق او دهن خل ويطيخ
حتى يذهب الماء مثل الاول ويصفى في انا زجاج .
ومنها ان يوحد ورق الاس النض فینقع في زيت الاتفاق ويوضع في الشس اربعين
يوما حتى يقبل الدهن قوه الاس .

^{a)} added B₃; omitted here as being a distorted repetition
^{b)} S B₂ الرجالين ^{c)} written ^{d)} W وبما

دهن الباين. - اما صناعة دنه فهو ان يوجد فقاشه^(a) فيلقى على الدهن الركيبي ويلقى في الشمس اربعين يوما ثم يصفى ويرفع . وان شئت صنعته بالتربيه بالمسارع راستغراج دنه وقد يصنع ايها على هذه الصفة وهو ان يوجد روس الباين الاخضر الربكيبي ويصر وتحذف عصارةه ويحمل عليها من دهن العرج ما يكون مثلها ثم يجعل على النار ويطبح حتى تذهب العصارة يفعل ذلك مرات فكلما اعيد عليه العصارة ان العن انوى واعطر وانفع .

دهن الاقلين. - اما صناعة دنه فهو انه يوجد من فقاشه^(b) عند تناهى طبل وهو اخضر طبل^(c) ويلقى عليه اربعه ارطال من الزيت الركاب او غيره من الزيت ويلقى في الشمس اربعين يوما ثم يصفى ويستعمل . وان شئت ديتها بالسم على ما تقدم ذكره في سائر الادهان .

دهن العضرا. - هلا دهن يقوم من قشور الخضرا وهو يقوم مقام دهن الورد في صناعته واما صناعة دنه فهو ان يوجد من قشور الخضرا جز فدق دقاناعما ويلقى عليه من زيت اللاقف او الزيت الركاب مثل وزنه وينفع فيه ثلاثة ايام او اربعه ويصر ويرفع وان شئت علفه للشمس كما تقدم في سائر الادهان وان شئت حلته على النار فهو اسرع الا ان الشس افع .

دهن المازريون. - اما صناعة دنه فهو ان يوجد من المازريون الاخضر طبل ويصب عليه خمسة ارطال ما يقل^(d) حتى يبقى رطلان ويصفى ويصب عليه من دهن اللوز المخلو ثلاث اواق ويطبح حتى يفنى الماء ويرفع^(e) ويستعمل عند الحاجة^(f) .

دهن البادرج. - اما صناعة عمله^(g) فهو ان يوجد من الدهن الركابي رطلان ويلقى عليه من البادرج بعد دقه طبل ويلقى للشمس او يلقى على العصارة^(h) الماء ويطبح نسعا ثم يصفى ويلقى على الصفر من الدهن الركابي ويطبح حتى يذهب الماء ويبقى الدهن ثم يصفى ويرفع .

دهن الانفع. - اما صناعته فعل ضربين احدهما وثوان يوجد من الاملج طبل ويلقى عليه من الماء ارطال ويطبح حتى يذهب الاربعه ارطال⁽ⁱ⁾ ويبقى الرطلان ثم يصفى S الفضماره^(j) دهنه عمله^(k) missing B₂, B₃, S missing B₂, B₃, S missing W d) missing W b) missing W a) missing B₂, B₃, S missing B₂, B₃, S missing W f) missing B₂, B₃, S missing B₂, B₃, S missing W g) missing B₂, B₃, S missing B₂, B₃, S missing W

ويلقى عليه من الدهن الركاب او زيت الاشقاق) رطان ويطبخ حتى يذهب الدهن ثم يصفى ويرفع .

وان شئت فدقه واتقنه في الزيت وعلقه للشمس حتى يأخذ الزيت قوه الدهن ثم تصفى وترفعه دهن المصطي . - اما صناعة دهنها فهو ان يوخذ من المصطي اوقيه فيسحق ويطرح عليه من الدهن الركاب رطل ويجعل على نار نحاس ويحرك دايما حتى ينحل المصطي ويغلي الدهن قوه ثم ينزل ويصفى .

وان اردت ان ياق اقوى ^(a) واعطر نعمت في الدهن من الاخر وقص الزيروه من كل واحد نصف اوقيه ثم يترك فيه ايا ما ملقا للشمس ثم يصفى ويرفع الى وقت الحاجه ان شاء الله تعالى ^(b) .

دهن الباذنجوريه . - اما صناعته فهو ان يوخذ من الدهن الركاب رطل ويلقى عليه من الباذنجوريه الغض ربع رطل ويسم راس الانا ويعيش في البر اربعين يوما ثم يصفى ويرفع وان شئت علقته للشمس ولكن الملعن في البر اقوى رايجه واعطر . والمشمس الطف وان بدللت له الباذنجوريه كل أسبوع كان اتفع واقوى فعلا .

دهن الميه . - اما صناعته فهو ان يوخذ من دهن البرج رطان ومن الميه اليابه اربعة اوقي يطبخ في انا مضاعف حتى يغلي الدهن ^(c) قوه الميه وراحتها وينزل ويصفى ويرفع ويستعمل وان شئت علقته للشمس على ما وصفنا .

دهن الارج . - اما صناعته فهو فلي ضروب وهو ان تأخذ قطعه فتمس في البرج ثم يترك الى الارجه النابه في شبرتها فيطلع بها اربعين يوما ثم تقطف ثم تجمر عليه ملعقة نفسه ريقه ويستخرج الدهن شيئا فشيئا ثم يرفع .

ونديصنع على هذه الصفة وهو ان يوخذ الارج الصغير الطيب الصغير فيطبح عليه السم حتى يغطى به الارج ويترك حتى يأخذ السم قوه الارج ثم يبدل له ارجا تفعل ذلك على قدر ما تريده من قوه الدهن ثم يستصر السم ويستخرج دهنه ويرفع .

وان شئت قشرت الارج واخذت قشره ورتبته بالسم ثم استخرجته ورفعه .

ويصنع ايضا بان يوخذ الارج اذا بلغ ^(d) واستخدم فيت ليله ثم تأخذ محاره ^(e) ليه

^{a)} written in the margin only S
missing W

^{d)} blurred S

^{b)} repeated B₂ اقوى ^(f)
^{e)} blurred S فخاره B₃

الحرف او مدهن نضه بين الحرف فغيره الارجح بحدا اطيفا لا يخلوها بخراج منها
شيء من جرمها فاذًا اجمع ما يحتاج اليه جعل في قفع قد يخرج بشيء من عنبر^(a) طيب
مرقين او ثلثة بعد ان يدخل الدهن في انيه اخرى وكلما كثرت التبخر كان الدهن اضر
واقوى لخس الدجاج ثم اجمله في زجاجه فبيقه القم وسد راسها بشمع وارفعه فيها الدجاج
من الادهان الجليلة القسر يدخل مداخل الطيوب التي تصلح ان يستعملها الملاوك واعل الزمامير
دهن التفاح. - اما صناعة دهنه فهي كصناعة دهن الارج من ان يربب التفاح
اطلور^(b) كما هو عضا بالسم ثم يتعسر السم ويستعمل او يوخذ قشره غصا فيقع في
الدهن الركابي ويعلق للشمس حتى يأخذ الدهن قوه التفاح ثم يسعيل ان شاء اند تعلى
دهن الخنفل السائج. - اما صناعة دهنه فانه يوخذ دمان الخنفل وينفرعا ويخرج
حب فقط ويترك^(c) فيه شحمة ثم يعلا زيتها ويعلق للشمس شهرا ثم يصفى الدهن ويرفع
او توضع كاهفي ثلوج بالزيت على رصف^(d) نار حتى يسخن الزيت وتصفيه وترفعه هنا
اذا اردت به الاستعجال. وصفه اخرى يوخذ من عصارة الخنفل الاخضر بعد تناهى
نضجه قدر اربعه اوطال ثم يلقي عليه من الدهن دطل ثم يحمل على النار ويطبخ حتى
تدهب العصارة ويبيقى الدهن ثم يصفى ويرفع وان لم تجد الخنفل اخذت البايس ورمت
بوجهه وقشره واغلت من شحمه ربع دطل والقيته على دطل زيت وطبخته حتى تخرج قوه
الخنفل ثم يرفع ويستعمل.

دهن ثنا الحمار. - اما صناعة دهنه فيصنع على وجوه احدهما ان يوخذ فيليق وتوخذ
عصارة ثم يضاف اليها شيئا زيت ثم تطبخ حتى تذهب العصارة ويبيقى الدهن. ومن
ان يوخذ ثنا الحمار فيقطع وهو اخضر ثم يقع في الزيت قدر ما يغمره مرقين وسد راس
الانا ويعلق للشمس اربعين يوما اونحو ذلك ثم يصفى ويرفع.

ومنه ان يطبخ في الماء اولا ولا سيما ان كان يابسا ثم يصفى عن الماء ويلقى على الزيت
وطبخ حتى يذهب الماء ويبيقى الدهن^(e) ثم يصفى ويرفع الى وقت الحاجة.

دهن الدفل. - النافع من الجرب. الربط يذهب به اصحابه مجرب. يوخذ من عصارة
الدفل قدر دطل ثم يلقي عليه نصف دطل زيت الورد او زيت الاتفاق ويطبخ ذلك حتى

by a different handwriting عنبه B₃ and in the margin عنبه B₃ عطر (a) W الرز (f) missing S
وصف or وصفيف (e) ويزل (d) B₃ ينشر (e)

تذهب العصارة ويبقى الدهن ويصفى ويرفع . وقد يلقي في موضع الدهن شمع أو شحم والدهن أحسن ثم يدهن به ويقيم يوماً وليلة ثم يدخل الطعام يفعل كذلك حتى يذهب الجرب وهذا الدهن يقتل الصبيان في البدن^(a) حيث ما كانت .

(for English rendering, see pages 114 ff.)

الزيت . - لم أقصد لـ ذكر الزيت هافنا في هذه المقالة على طريق هذا وإنما تحدث ذكره على سبيل الدوا لا في ذكره في كتاب في الأغذية بواسع قوله فقول ان القول انواع الزيت ما كانت رائحته عطرية وطعمه للزيد سليم من اللذع والحرافه ويكون يذهب ظاهراً فـ كان كذلك كان اسهل الى البروده واليسوس وهذا الصنف يصلح في علاج الاعضا الصعيفه ويدخل في المراهم التي تحتاج الى القبض وتفويه الاعضا وهو اقوى صناعة دهن الورد من غيره وما كان من الزيت مستخرجـا من زيتون اسود قد استحكم نضجه فـ يربط^(b) ويـخـنـ اسـحـانـاـ مـعـدـلاـ وـيـرـخـيـ الـاعـضاـ وـيـسـطـهاـ وـيـدـهـاـ وـيـذهبـ بالـاعـضاـ اذا دهنـ بـهـ وـيـرـخـ منـ خـارـجـ^(c) ولـديـاسـقـورـيـدـسـ قولـ فيـ الـزيـتـ قالـ انـ جـمـيعـ انـوـاعـ الـزيـتـ سـخـ مـلـيـنـ لـلـبـشـرـ وـبـاسـطـهـ لـلـاعـضاـ مـانـعـ لـلـعـرقـ منـ الخـروـجـ منـ مـامـ الـبـدـنـ اذـاصـحـ الـجـلدـ بـهـ مـائـهـ لـلـبـرـدـ مـنـ الـوصـولـ لـلـاـبـدـانـ بـرـعـهـ ضـعـفـهـ لـقـوـةـ الـادـوـيـهـ القـاتـلـ^(d) بـلـازـوـجـهاـ مـيـنـهـ لـتـلـيـنـ الـبـطـنـ وـأـنـماـ ذـكـرـ هـذـاـ^(e) دـيـسـقـورـيـدـسـ عـلـىـ الجـمـلـهـ وـعـنـ التـلـيـنـ يـحـتـاجـ لـ التـفـصـيلـ وـالـتـعـدـيـهـ مـنـ طـرـيـقـ ماـ وـصـفـتـاـ مـنـ اـخـلـافـ اـثـوـاعـ الـزيـتـ وـلـكـنـ يـطـلـ بـهـ الـكـاتـبـ وـيـخـرـجـ عـنـ الـفـرـضـ الـذـيـ قـصـدـنـاـ لهـ .

إذا شرب من الزيت تسعة أواق مع مثله من ما الشير وما حار أسهل البطن وإذا طبخ بشراب وشرب منه تسعة أواق وهو حار نفع من المنس العارض من الفضول الغليظ وخروج الود وحب القرع من البطن وإذا احتقن به نفع من التولنج العارض من درم الماء وبين السده المتولده من الرجيع اليابس وإذا اكححل بالزيت العتيق أحدّ البصر^(f) . دهن اللوز المر . - النافع لارتفاع الارحام وانقلابها وأورامها الحاوية والعله التي تعرض من اختناق ارحام النساء والصداع ولو بوجع الاذن ودوبيها وطنينها ويفعل الود المتولد فيها شفـعـ لـسـدـ الـكـيدـ وـالـطـحالـ نـافـعـ الـرـيوـ وـلـوـجـعـ الـكـلـيـ وـعـسـرـ الـبـولـ وـإـذـاـ خـلـطـ بـعـسلـ واـصـلـ

B₃ بـهـذاـ^(a) B₃, B₃, B₃, القـابـلـهـ^(d) B₃, B₃ يـرـخـ^(c) B₃ رـطـبـ^(b) missing W added B₃, B₃, S. انـ شـاـ اللهـ تـعـالـاـ^(f)

الرسن ^٢ يُشع ودهن المنا ودهن الورد وحل عل الصدر من خارج نفع من الريح ^{وكله}
اذا حل عل صاحب البارد ^٣ وورم الطحال من خارج نفع ايها ويقلع اثاره
تكون في الوجه من فضول البدن وينفع الكلف ويحيط تشنج الوجه وينفع من تكثير
البصر وكلاه اذا اكحل به واذا خلط بخمر وطل به الراس نفع من القرح ارجو
والابريه التي تكون فيه .

دهن اللوز الحلو ^٤ . - دهن اللوز الحلو لين في وسط الدرجه الاول صالح الكبير
فتح للصد نافع الصدر والبريه ملين مرطب يخشو نها نافع من حرقة البول يحل الاريز
الصلبه ويحيط التشنج في اي موضع كان .

دهن النار . - قوه سخت مليه مفتحه لافوه البروق وبخله للاعضا وترافقن لكر
وجع من اوجاع الاعضا والاقشعرار واجاع الاذن والزلات والصداع واذا شرب غنى صاحبه
واضر به راما خاصه نفعه للإيدان البارده وينفع من الحكه والجرب المقادم ومن صلبه
الجلد ولقويا العارض من البلغم الملاوح اذا دهن به في الحمام ويقتل الديدان ايها كانت
في الجلد والقول والصبيان ويفصل الابريه وينفع من داء القلب وداء الجي ويتبني ان
يدهن به اول ساعه من النهار ثم يستحم العليل في الساعه الناسيه بعد ان يفصل رام
بعسل ^٥ ودقيق الحلبه وليخذر الم تعالج بهذا الدهن من كان مزاج راسه او جلة يده حارة
واجود ما يكون من دهن الغار ما كان حديثا اخضر شديد للراوه حريقا في منام
واذا شرب منه وزن درهم مع اوقيتين شراب جلاب لانه دهن فيه حمه ويسهل بقرو
وهو يضر بالاعضا الباطنه وينفع من الماء الاصفر .

دهن القمع . - وهو حار نافع من القوبا المتبده وذلك ان تحكم القوبا بحرقه حتى
تحقق ان تدبى ثم يجعل عليها الدهن يفعل ذلك بها حتى تبرا ان شاء الله تعالى .
دهن البنج . - بارد مخدر للحواس نافع من السهر اذا قطرته في الافت ويسكن
الصداع الصفارى .

وينفع من قروح الراس اذا كانت من الماء الصفرا ومن الحكه والجرب وينفع ذ

c) The whole paragraph is missing W ^٤ الجصاء B_p, B_s, S ^٥ السوس (lotion) B_s and S, which is possible also.

الفرزجات فiskن اووجاع الارحام وقد يدمن به مواضع الصبان في اووجاع البدن فيقتلها^{a)} ويدمن به الصدغين فيجلب نوما معتدلا وقد ينفع من وجع الاذن اذا قطر فيها.

دهن الخروع. - تافع من الجرب والقرحه الريبيه التي تكون في الراس والاورام التي تكون في المعده ولانقسام فم الرحم وانقلابه والاثار السمحه المعارضه من اندماج القرحه ولرجع الاذن وينزل الحيجه متى للعصب من اللزوجات المربيكه واذا شرب اهبل البطن يخرج البرد الذي يكون في البطن واذا طل على دا الشلب نفسه.

دهن الخردل. - هو حار لطيف يصلح للأوجاع البارده المزمنه ويخفف ^{b)} الريبيه ريفتها وينفع من دا الشلب ومن اووجاع المفصل ومن الفالج ^{c)} وارعشيه والاختلاج والقره والتانس وينفع من لسعه العقرب وجميع اطراف الالدنه الاصغي واذا دهن به مؤخر الراس بعد حلقه باللوسي نفع من النسيان وقوى الحفظ وحلل البلغم الذي هو سبب ذلك ويسخن العصب.

دهن البيض. - تافع من اووجاع المعده ومن الضربان فيها ولو يزع الاذن والضرس.
دهن الازرقية. - حار سهل الما الاصفر يشرب منه وزن درهين بلين اللفاح سهل الما الاصفر في عله الاستفا.

دهن الاملج. - دهن الاملج بارد قابض وخاصته تقويه المعده والمعده والنفع من الپايمير واذا دهن به الشعر منه من التساقط وقوى اصوله وسوده.

دهن الورد. - قبل ان نبدا بذكر اصناف صناعاته فلتذكر هنا هنا منافعه جمله ثم نذكر بوصف صناعاته واخذ ايضا في ذكر منافع كل صنف على التفصيل والتحديد ليكون ذلك ابين ووصفتاه ابلغ فنقول ان دهن الورد من الادهان المقدمه العجيبه ومنافعه كثيره جليله وهو بارد قابض في اعتدال ليس بردء ظاهرا ولا قبيشه بينا ولا اطلاقه الطبيعه مثرا ولا امساكه ايضا قويها يطلق الطبيعه اذا شرب منه مقدار ازيد ويقيض العصبه اذا شرب منه مقدارا معتدلا ولا سيما اذا شرب بعض الاشياء الملينه ان اريد ^{d)} اطلاق الطبيعه وان شرب بعض الاشياء الماسكه اسلك ^{e)} الطبيعه وهو مسكن لمجتمع الاوجاع التي

a) اريد From to in the margin B₃ to B₂, B₃ بخفف (b) blurred S
 b) From to in the margin B₃ to B₂, B₃ بخفف (c) missing S.

تكون من الحر وان شرب ^{a)} نفع من حرارة المعدة والتها بها وان دهن به من خارج فعل مثل ذكر
وكذا ان قطعه على بعض الاشربة الالاته الكبد الملتئه والمعدة والاحشاء تفعها وان شرب من حمأة
البزور قطعها المشوهة المحصنه على النار نفع من اطلاق الطبيعه التي يكون سببها ادوية حاره
سيهله ^{b)} ونفع من سخ الشما وكذاك اذا شرب مع لبن النساج نفع من حرارة البزور
وحرقه المكانه وشيشه ^{c)} ويجعلها يدفع من قروح الكليتين وحرها ^{d)} والتها بها ويزع عن
ديها بيبطش ^{e)} وهي الله التي يشرب صاحبها الا الكثير ويبيوله سريعا وكذاك يفعلا ^{f)}
دهن به من خارج اذا مزج مع خل وسكب على الراس سكن الصداع العارض ^{g)}
وهج العين والسمون ومن حرارة المحي والبرسام وان ضرب بالخل وحمل على البدن ففع
من الشرى والحك والجلب ولا يبني ان يفعل ذلك الا بعد تقيمه البدن وكذاك يشعر
اذا سكب على الراس الذي فيه الوعي من قبل ضربه وشقه العظام وظاهر صفاق المزع
وضرب عليه دهن الورد مذقا كان عوضا من دم الشفائيه والحسام ففع ذلك وسكن الوعي
ونفع الورم الحار فيها ومن الوعي الكابن مع ريح حاره اذا شرب مع حسو الشعير ففع
من ابتدا اللل وفرحة الريه ونفع من اللل الذي يكون من قبل ادخال الاعضا الريه اذا
احتقن به نفع من سخ الشما وسكن الوعي اذا قطع في الاحليل بعض الشياقات او بين
الناس ففع عن الحرقه والسلخ الذي يكون في التضييف اذا مزج به البدن من خارج ففع
من الفرق المفترط اذا غرب به الجراحات العتيقه انت الحم فيها اذا صنع منه مرهم مع
بياض ^{h)} اليقه المسلط ⁱ⁾ وحمل على العين الشدیده الحر والوعي سكها اذا صنع من
قبروطى ^{j)} يشع ابيض وحمل على شفاقي اليدين والرجلين تفعهما ومن شفاقي الشفتين وقرح
المخترن اذا حل في قطته على السن الذي قلع سكن وجعه اذا تمتصض به مع لسان
الحلل ففع من قروح الفم والقلة وينفع من جميع القروح التي تكون من المره الصغيرة
والدم الحار مثل الشهد ^{k)} والمحمره وحرق النار اذا حل عليها وحده اوعي شمع ابيض وقد
يدخل دهن الورد في كثير من الاقراص التي تتفع من نزف الدم والمرام وقد تنت به

a) missing B₃
 b) missing B₃
 c) missing B₃
 d) missing S
 e) from to وان شرب
 f) مثل ذلك
 g) نفس
 h) B₃, B₃
 i) B₃, B₃
 j) Missing B₃
 k) in margin only B₃

الدواء القويه الحده المشروبه ومنها شع كثيره والمتطلب قد يتيس بالقليل على الكبير وبالظاهر على الباطن وبالماضي على النايب ويخرجى الامور على مراتها وحثنا يغى سعن المحسن والنظر فقد ذكرنا من منافع الورد ما فيه كفايه .

دهن المرزنجوش . - هونافع من الاعيا اذا دهن به في الشخص او في المقام ويتفتح من الفالج واللقوه اذا سمعت به او صنع في الفسادات وان قطر في الانف اخرج الرياح رفع من الامراض البارده وان قطر في الاذن سكن السوى والعلمين وحلل الرياح التي فيها رلا سبا انه رب باللوز وقد يدر الطمث ويتفتح من لسعه العقرب واجوده ما كانت فيه رابحة المرزنجوش قوية .

دهن المختصل الدفع . - نافع من الامراض البارده واذا شرب اسهله بلغما وشام كثيرا وخارج المياط وحب القرع من العلن واذا حل على البره معمودا بعراوه البقر فعل ذلك واذا احتقن به نفع من القولنج الذي يكون سببه فضول غليظه واذا دهن به الراس نفع من الابريه ومنع الشعر من التقط وادا قطر منه في الاذن نفع من الدوى والعلمين وقتل الدود المتوله فيها واذا جعل منه على حسوفه وحمل على السن الوجه وهو سخن جدا ازال الوجه واذا دهن به مواضع الوجاع البارده حيثما كانت ازالتا .

(corresponds with English rendering, pages 121 ff.)

دهن المرزنجوش . - النافع من انضمام فم الرحم وانقلابه ومن الاورام العارضه فيه من البرد والوجاع والاختناق^٢ العارض فيه الذي يعرض منه النقى^٣ ويدر الطمث ويخرج الشبه ويشفع من وجع الظهر وعرق النساء ويجلب العرق ويحلل الاعيا .

يؤخذ من ورق الاس والسليخنه والمرزنجوش والقيصوم من كل واحد او قيء ومن الزيت اربعه^٤ تدق الادوية وتتفتح في الزيت عشره ايام الى عشرين يوما ويصفى ويرفع .

دهن لحر المعدة . - الذي اضعف قواها وولد فيها القى والحرقه والالتهاب وقد تعرفنا تججه .

يؤخذ من ما الحصرم وما الرومان المر وما الاس الغص وما الورد الجوري وما العرج الغص من كل واحد ثلث رطل فتجعل جميعها على نار ليته مع دهن الورد ودهن البنفسج ^a و الصابون ^b ^c ^d ^e ^f ^g ^h ⁱ ^j ^k ^l ^m ⁿ ^o ^p ^q ^r ^s ^t ^u ^v ^w ^x ^y ^z ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} 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^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ ^{jj} ^{kk} ^{ll} ^{mm} ⁿⁿ ^{oo} ^{pp} ^{qq} ^{rr} ^{ss} ^{tt} ^{uu} ^{vv} ^{ww} ^{xx} ^{yy} ^{zz} ^{aa} ^{bb} ^{cc} ^{dd} ^{ee} ^{ff} ^{gg} ^{hh} ⁱⁱ

ومن اللوز الحلو من كل واحد ثلث رطل^٢) ويلقى على مثقالان صنفان وبمقابل رامل
ويطيخ حتى يذهب الماء ويكتسى الدهن وعند ذلك يصفى في إناء ويكتوى بـ مثاليتين كثيرة
ورق وبيقون^٣ به مثقال إلى مثاليتين ويمرغ به البدن من خارج .

حده دهن يطلق العلبيه . - وينفع من التولنج محجب يوغذ ثوار بفتح وحب سفريجل
وحب القرطم ووزر الكزان من كل واحد عشره دراهم وزبيب متزوع العجم زنه عشرين
درهما ويعطي متزوع الاقاع عشرون حبه خيار شبر وترنجين من كل واحد عشره دراهم
بعض ويطلع ف اربعة اربال ما بناريه حتى يبقى رطل ويعوس ويصنف ثم يلقي على
ذلك الصنو نصف رطل دهن لوز حلوي ونصف رطل دهن سكر ويطلع حتى يذهب
الما ويغلى الدهن فتند ذلك ينزل عن النار ويرفع منه اوقيتين بما حار فانه عجيب فيه
وصفتان) ٤)

دشن الفته للجرب . - الذى لا يعمل فيه دوا يقلع جميع اصناف الجرب ^(٢) يوخد من عصارة الدفلى الرطب رطل او من طبیخه اذا لم یقدر على عصارتها والعصارة اقوى وعن ما الكفرنی الرطب نصف رطل ومن المیه السایله نصف رطل ومن الشع الشع الاصفر ^(٣) ربع رطل وطن زيت الورد نصف رطل وان لم یسكن ^(٤) من زيت الورد فدهن الورد وان لم یسكن دهن الورد فزيت انفاق يجمع الجميع الا الشع في قدر ويطبخ حتى تذهب العصاريان وتبقى المیه والدهن فحيثلا یبقى الشع ويغلى حتى يتمزج مع الدهن ثم یبرد ويرفع ويطلق منه على الجرب في الشمس او عند النار ويبقى فيه يومین ولیلتين ^(٥) ثم یدخل في الثالث الحمام وينسل بتحاله القمع ودقیق الغول متقویین في الخل ^(٦) ثم یعمل ذلك ثابه ^{*}
ونثاله فان جميع الجرب یدذهب ولا یبقى منه على الجسم شيء.

دفن المُنْظَل ٢). يوجد من المُنْظَل خسرو مثقالاً ونر بيون ثلاثون مثقالاً لين الشرم
عشرون مثقالاً يرضي المُنْظَل رضا حسا ويصب عليه من الماء ثلاثة ارطال ويترك

a) from بـ to missing B₂. The same phrase is repeated twice B₃
 b) لا يفـ (e) جـ اصناف الـجـرب (d) Wـ وـيـقـى (f)
 c) Missing B₂ (g) from زـيت الـورـد missing W
 f) مـ يـمـكـن مـن مـا زـيت الـورـد (h) نـصـف (i)
 g) B₃, crossed out (j) This formula, according to al-Zahrāwī,
 h) Sـ او ثـالـثـه (k) تـالـيف ابن مـاسـوـيـه (Mesue the Elder)
 k) was devised by Ibn Māsawayh (Mesue the Elder)

THE TREATISE ON THE "ADBĀN"

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في ذلك أيام فإذا كان في اليوم الرابع حل على النار وصب عليه من الزيت العتيق
وطبخ بنار لينه حتى يذهب ذلك مما ويبيقى ذلك ثم يصفى تصفيفه ويؤخذ ثم يصى
بالقل ويعاد الدهن في القدر فإذا انخل فيه شم المحتظل الذي الفريون ولبن الشبرم سحريين
سحريين ثم يساط شوطاً^{a)} حتى ينزل عن النار ويرفع فإذا أردت أن تعالج به من
الخام والرطاخ الساكت في الماء فاسق العليل متقل سكبيع عند نوره فإذا أمسح فانفه
بعلا آخر بما قاتر وادهن به باطن قدميه وبين وركيه فإنه يخرج الع GAM الخراجا عميا
وهو بسيط من غير أن يسكن سكبيع.

صفه دهن يحلق الشعر. - مثل النورة لابن ما سوية يدخل من القل جزء من النورة
جزان ومن الزرنيخ الأصفر عشرة أجزاء يجمع ذلك وصب عليه من الماء مقدار ما يكفى
به ويترك يوم^{b)} ثم يصفى ثم ترده عليه اعمل هذا حتى لا يبقى من قوة الوره شيء ثم
تأخذ من أي دهن ثبت جزء^{c)} ومن هذا الماء ثلاثة أجزاء تقطبه طبعاً ريقاً حتى يذهب
الماء ويبيقى الدهن ثم تصفيفه في قاروره فإذا احتبست اليه في سفر أو حضر طابت منه
ذاته لا يليث أن يحلق الشعر فإن أحببت أن لا تكون له رائحة الزرنيخ فالق في ربة^{d)}
درهم زعفران.

وقد ذكر ابن الجزار أنه أصابه بخط يد الحسن بن عمران وقد أضافه^{e)} إلى
ابن ماسويه ولم يجره.

صفه دهن ^{f)} يمرخ به الغضوه. - يشعل فيه الحرارة على المكذا . يستعمل في علل
اللثامن الباردة يدخله فلفل وجندبادستر وقربيون من كل واحد مثقال عاشر فرحا مثقلان
بسحق ويلقى عليه أوقية دهن القسط ويمرخ به الغضوه مرحرا شيئاً.

دهن الخلية. - يدخله من الخلبة أربعه ارطال^{g)} ومن الزيت منا والماء رطلان ومن
لقيس الذيره نصف رطل ومن السعدي العراقي رطل تدق الذيره والسعدي وتتميمها في
الزيت مع الخلية سبعه أيام وتحركه في كل يوم مرات كثيرة ثم تصفيفه وتعصره ورفقه .
صفه دهن يسقاء المسلولون. - بما الشعير ولبن الازن اذا لم تكن حبي رحارة بما اخعبه

ويجريه أحد^{h)} بن الجزار.

^{a)} W ساط سوطاً ^{b)} B₃, S, W ^{c)} missing B₃ ^{d)} missing B₃ ^{e)} W اضاف ^{f)} B₃ دوا ^{g)} This whole passage on rubbing liniment
prescription is missing S ^{h)} missing B₂ ⁱ⁾ missing B₃

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يُؤخذ زبيب مزروع العجم عشرون درهماً بحسب ما يه جبه عتاب ما يتنا سب واصل السوين^a
عشرون درهماً خيار شبر حتى مثل ذلك يطبلن بخسه ارطال ما حتى يبقى رطلان ونصف (b)
ويلقى عليه من زيد النم ازيدان ودهن حب القرع اوقيه ونصف ويطبلن حتى يذهب
الا ويبقى الدهن ويصفي ويستعمل على قدر الحاجة .

(one "raql" and a half) R._g السوين (a)

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ENGLISH TRANSLATION OF THE RECONSTRUCTED
EXCERPTS FROM THE 25 TH TREATISE

by Sami Hamarneh

The Olive Oil. — In many ways it varies in regard to its strength, nature, and being useful or harmful. This is because it could be new, old, or intermediate. It could be also [the product] of salted olives, or from olives that were mingled with leaves, or from olives that were buried in subterranean repositories to rot. Of it [the oil], some is extracted with [the aid] of potable water, some from olives dried in the sun until all the water is evaporated then stored, some extracted by oil-press without water, and some extracted by fire. The oil also differs according to lands and locations, another factor that contributes to the variations in its strength, nature, and in being useful or harmful. However, the oil which is extracted from green unripened olives is called by the Greeks the 'Infāq' oil. *)¹⁾.

*) The reconstructed Arabic appears p. 81 preceding this English rendering. The footnotes indicate lacunae and variants that could alter the intended meaning, and the reading we prefer and, when necessary, the reason for it. Variants that could not change the meaning, including punctuation and spelling, will not be mentioned. Whenever additions of any consequence have been inserted in the translated texts, the words concerned have been set apart by brackets to signify the following:

() = parenthetical remark by present authors; words explanatory to text;
[] = words being added to the literal text as found in original manuscript.

¹⁾ The word "infāq" or "unfāq," from the Greek "omphaklion," designated the oil extracted from unripened olives. (*Mūsī Abī 'Imrān Maimonide, Un Glossaire de Médecine Médicale de Maimonide*, ed. and tr. by Max Meyerhof (Cairo, 1940), 64.) Olive oil has been well known and manufactured in various ways since remote times. It was repeatedly mentioned in the Bible (*Genesis*, 28: 18; *Exodus*, 27: 20; *Isaiah*, 1: 16) and was used still earlier. At an early date in antiquity, olives seem to have been introduced to northwestern Africa and Spain, and perhaps since then have been cultivated there. (Friedrich A. Flückiger, and Daniel Hanbury, *Pharmacographia, A History of the Principal Drugs of Vegetable Origin* (2nd ed., London, 1879), 418.) Of pharmaceutical interest is the method of preparing the colorless and odorless olive oil, "al rikābī," for use in compounding medicines. This improved vehicle was not originated by al-Zahrāwī, however. It enhances the possibility of keeping the incorporated drugs from deterioration for a longer period, and it helps to avoid interference with the color of the compounded material.

Dioscorides proposed that the 'Infaq' oil is Greek [in origin],¹⁾
but we call it 'oil of the water.'

The 'Duhn' al-Rikābi'. — The oil should be washed—according to
this method—until it becomes colorless and odorless, when it will
be called the 'duhn al-Rikābi.' It was so called inasmuch as it
constitutes a vehicle for all [substances] that are mixed, dispensed
and applied with it. Here is how it is [prepared]: Take new oil good
in smell and delicious to taste, with no apparent quality or strength,²⁾
and put it in wide pots in the sun. Then add potable water to it;
and lift up [the oil] with scoops and change the water day after day.³⁾
This is done continuously until [the oil] whitens and becomes color-
less. Leave it until the oil floats to the top of the water, collect and
take out for [storage]. This you do if you are in a town where there
is no glassware.

But to wash it in glass containers is more elegant and much
better. Take a glass container, of such size as to hold two to three
'ratls,'⁴⁾ having two openings, one narrower than the other. The

¹⁾ Dioscorides describes the therapeutic uses of The 'Infaq' oil and re-
commends it as the best among all kinds of olive oil for healthy people.
(*La 'Materia Medica' de Dioscorides*, Arabic tr. by Stiphān ibn Basil and
corrections of Hunayn ibn Ishāq, ed. by César E. Dubler and Elias Terés
(vol. 2, Tetuan and Barcelona 1952-57), 35-7).

²⁾ This phrase is not entirely clear in the text. Probably it means that the
oil is a neutral vehicle, at its best when devoid of any of the four qualities
that give a substance therapeutic activity in the Galenic scheme of humoral
pathology.

³⁾ This ambiguous clause is stated in the same manner in all four texts.
But one infers that it means something like this: Wash the oil with water in
the pot by shaking; wait until the oil floats to the top; take the oil with a
scoop into another pot, and add a new amount of water for washing, and so on.

⁴⁾ The "ratl" and other measures and weights used in this period and
mentioned in this treatise have been listed below, together with today's
equivalent:

Ratl — one pound weight or one pint measure = 128 4/7 dirham, or 12
ouqiyah, or 1/2 manā (see W. f. 522; and M. Jungfleisch, "Notations
conventionnelles se rencontrant sur certains poids arabes en verre,"

Bulletin de l'Institut d'Égypte, 32 (1950), 257-274.

Midd = 1 1/3 ratl or 1/4 sā'.

Qast (pl., aqsāt) = 1/2 sā' or 2 midd (pl. amdād).

Mithqāl = 1 3/7 dirham (dram).

Ouqiyah = 10 5/7 dirham (dram). Al-Zahrāwī considers the ouqiyah equal
to 10 dirhams of "duhn."

Dirham (dram) = 8 dāniq.

Dāniq = 8 2/5 grains (*continued, next page*).

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wide opening—which could be closed by the thumb—is at the top, and the narrow—which is only wide enough to pass a probe—is at the bottom. Then pour in the oil and the hot water, to two-thirds of the container's capacity, then put your thumb on the mouth [the top opening] and your finger on the hole [the bottom opening] and shake well. Then leave in the sun for an hour until the oil floats to the top of the water. When the oil floats to the top of the water then take off the piece of cotton—which was put in the bottom [opening]—and let the water drain. Do the same repeatedly until [the oil] whitens and becomes colorless and odorless.¹⁾

Calculated from section five of the 29th treatise of *al-Taṣrīf* with reference also to other works such as: Muhammad ibn Ahmad al-Khwārizmī, *Mafāhīḥ al-‘Ulūm* (Cairo, 1342 A.H. [1922 A.D.]), 11-12; Edward W. Lane, *Arabic-English Lexicon* (Book 1, Part 3, London, 1867), 1102; P. P. E. Guigues, *Le Livre de L'Art du Traitement* (Beirut, 1902), xvi); and George C. Miles, *Early Arabic Glass Weights and Stamps* (New York, 1948), 6-19.

¹⁾ This device will be recognized as a crude form of the present-day separatory funnel; the process is the one still used to wash substances out of a liquid by shaking with an immiscible solvent. The method described by al-Zahrāwī reminds us of the way some practicing pharmacists used an ordinary funnel, in lieu of a separatory funnel, up to the present century (e.g., see Henry V. Army, *Principles of Pharmacy* (2nd ed., Philadelphia, 1923), 141). Indeed the Roman glass funnel pictured by Umberto Tergolina-Gislazoni-Brasco, *Civiltà Romana: La Farmacia* (Mostra della Romanità, No. 12, Rome 1939), P. 26, would have been useable as a separatory funnel in much the same manner that al-Zahrāwī describes. Hans Schindler, in a recent historical paper, stated that the separatory funnel "as we know it, seems to have been in general use for not much more than a hundred years . . ." (Hans Schindler, "Notes on the History of the Separatory Funnel," in *Journal of Chemical Education*, 34 (1957), 528-530). Schindler, and others, seem not to recognize that in beginning this facet of history with Berzelius and with Faraday in the early nineteenth century, they refer to a form of separatory funnel and a technique that had remained virtually unchanged for at least eight hundred years. Compare the device and technique described by al-Zahrāwī in the above passage, for example, with J. J. Berzelius, *Chemische Operationen und Gerätheschafsten*, translated into German by F. Wöhler and published as Volume 10 of "Lehrbuch der Chemie" (4th ed., Dresden and Leipzig, 1841) 493 and Figure 36 in Plate VI. The separatory funnel pictured by Berzelius (noted above) reminds us also of a Greco-Roman amphora with the tip broken off. However, according to Martin Levey, *Chemistry and Chemical Technology in Ancient Mesopotamia* (Amsterdam, 1959), 16-17, the basic principle of the separatory funnel appears to have been applied already in ancient Mesopotamia. He describes a wide-mouth earthen pot with a small orifice protruding near the bottom to be a separatory vessel for non-miscible liquids that dates back to 3600 B.C.

The 'Duhn' of Bitter Almond.—The method of extracting its 'duhn' follows: Take two 'ratls' of bitter almond, clean and dry it thoroughly, then pound and crush well with one-half 'ouqiyah' of boiled water, in a wooden mortar, until it becomes [as soft] as the brain. Knead it then well by hand and if you see the 'duhn' coming out from among your fingers [then it is done], otherwise you add boiling water a little at a time until you see the 'duhn' coming out. Be sure not to add too much water to render the almond like unto milk and spoil [it] and the 'duhn' will not come out. [If the 'duhn' came out] then [put it] in a clean cloth and press it by hand. When the 'duhn' starts to come out from among your fingers, collect it gently and store. Then pour more boiling water on the remaining pressed substance and leave it until [the water] is absorbed. Do the same as you did before until all the 'duhn' comes out. The quantity of the 'duhn' which will come out [will be equal] to one fourth of it, and at the most one third will come out of it. Therefore, the quality of the almond will be measured according to the 'duhn' [extracted] from it, and in accordance to countries, the age and softness of the almond.¹⁾

The 'Duhn' of Laurel.—The manufacturing of its 'duhn' is well known. Most of this 'duhn' comes to us from the West near Sabtah (Ceuta) due to the great number of [laurel trees] found there. It is [extracted] in this manner. Take the grains of laurel when very ripe, pound the grains, put into a big pot and pour on more water, and cover it above. Then cook over a low fire until the 'duhn' shows on top of the water, and collect it gently.

It could be prepared by another method: That is to take five 'ratls' of the 'rikābī' oil and one 'ratl' of the grains of laurel. Pound [the grains] and cook well with the oil, press, take out and store.²⁾

The "Duhn" of Wheat.—The method of extracting it is as follows:

¹⁾ That is to say, if the extracted "duhn" is less than one fourth of the original quantity, then the quality of the almonds was not good. The dry seeds of bitter almond used by al-Zahrāwī come from the tree Amygdala amara (Rosaceae), which is indigenous to countries bordering the Mediterranean Sea. Hence the tree apparently was known in the native country of al-Zahrāwī.

²⁾ Most commonly the cherry-laurel leaves (common laurel) were employed for pharmaceutical preparations, but al-Zahrāwī insists upon the use of the seeds of laurel for his "adhān."

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Put clean wheat inside of a glass bottle plastered with 'lutum sapientiae', and shut the mouth of the bottle with thin yellow fibers of flax, which are at the mouth of the bottle to prevent the wheat from falling out when the bottle is turned upside down. Take a brazier and make a hole in the middle just to pass through the mouth of the bottle, downward; and put close to the mouth of the bottle a container to receive [the 'duhn'] that drops down from the wheat. Put around the bottle dry fuel and light it up with fire, whereupon the 'duhn' drops and is collected to be used as we recommended. It is marvelous.

It could be prepared also by another method: That is to take the wheat and put it on a piece of marble, then heat a thick iron-plate and put over the wheat, whereupon the 'duhn' comes out and is collected gently. This method of collecting it is usually done by the blacksmiths.¹⁾

"The 'Duhn' of Castor-Oil Seed."—The extraction of its 'duhn' is in this manner: Take castor oil seeds which are already ripe on the trees; lay them in the sun and when they break out of their shells and fall down, collect the interior; put into a mortar, and pound until it is very soft. Then transfer it into a pot and pour water over it and boil. When all its 'duhn' comes out, take the pot off the fire, collect all the 'duhn' in a piece of wool and put aside until need arises.

It could also be extracted as the 'duhn' of almond is extracted; but as its substance is placid, it therefore requires skill and gentleness.

The 'Duhn' of Mustard.—The method of extracting its 'duhn' is to take the seed and grind it well, then macerate in warm water, mix a little oil with it, press in a thick cloth, and store.

The 'Duhn' of Radish.—The method of extracting its 'duhn' is well known, since painters in Egypt extract it frequently. And due to its abundance they [in Egypt] light it in the lamps instead of the [olive] oil.

*The 'Duhn' of Black Cumin.*²⁾—The manufacturing of its 'duhn'

¹⁾ Cf. 'Abd Allāh ibn Ahmad ibn al-Bayṭār, *al-Jāmi' li Mufradat al-Adviyyah wa al-Aghdhiyyah*, (vol. 1, pt. 2, Cairo, 1291 A.H. or 1874 A.D.), 116. Here Ibn al-Bayṭār follows *al-Taṣrīf* almost verbatim, without mentioning that the last method was followed by the blacksmiths.

²⁾ *Nigella Sativa* Linn. See Max Meyerhof, *Un Glossaire de Matière Médicale de Maimonide* (Cairo, 1940), 183.

is in this manner: Take two 'ratls' of black cumin, put on a plate and fry until it bursts open, then leave to cool, and pound until it becomes as the brain. Thereafter, take water in which fenugreek was macerated for one day and one night; after straining off the fenugreek, pour it into a cooking-pot and heat. When it warms up, add the black cumin to it and let come to a boil once or twice. Then take it off the fire, and gently collect the 'duhn' with your palm, and place into glassware and store until need arises.

The 'Duhn' of Chick-peas.—Take the chick-peas and crush into grit. Then take a casserole and place the chick-peas in it and bind [the mouth] with a piece of cloth. Then take another casserole of a wider mouth than the pot in which the chick-peas were placed and invert it over the pot which contains the chick-peas [in a way] that its mouth be inside the opening of the empty pot, then plaster with mud. Thereafter, dig a pit and place the empty [pot] so that the one filled with chick-peas remains outside. A gentle fire is then applied to it until the chick-peas get sweaty, and its 'duhn' comes out and drips into the empty pot—God the almighty willing.

The 'Duhn' of Eggs.—The extraction of its 'duhn' is in this manner: Take ten eggs, boil, take off the eggshells, and place them in an iron ladle. Then raise the ladle over a live coal fire until the eggs burn, the 'duhn' comes out, and the yolk turns jet black. Then store in a bottle.

It could also be extracted according to the [following] method that I obtained from some of the manuscripts, which mention its usefulness for all the body's diseases and any unknown ailment. It is a proven medicine that aids pregnancy and heals the uterus for bearing of children. Take the eggs, cook as they are, and when cooked, take out the yolk, rub down and put it—unmixed with anything else—in a piece of clean white cloth. Then take a new casserole, half filled with potable water, and when heated suspend the piece of cloth containing the yolk over the water by means of a wooden rod traversing the mouth of the casserole without letting the cloth touch the water. When it becomes softened by the effect of heat on it, take out, knead gently and press, for it responds to pressing. Its oil will then come out and is collected in a glass container and stored. It is tested.

*The 'Duhn' of Elder Balsam.*¹⁾ —For extracting its 'duhn' tear the branches of balm tree into shreds with a lancet. The 'duhn' will flow down from it and is collected. Certain sages mentioned that it is to be found after the rising of Dogdays. This elder balm tree, from which this 'duhn' is [extracted], grows in particular in the land of Egypt in one of its cities called Heliopolis.

*Naphtha.*²⁾ —[It] is two kinds: manufactured and natural. The natural flows out from springs, black, of putrid smell, and becomes white after it rises up. The manufactured is made from certain 'adhān'; and both kinds are used. They both are hot in the fourth degree and have the faculty to attract fire.

The 'Duhn' of Snakes.—The method of its extraction is to take three 'aqṣāt' [8 'ratls'] of the 'duhn' of sesame and transfer into earthenware, and cast into it five to ten of the black snakes, according to the smallness or largeness of the snakes. Then take down from the fire and let it cool for a while. After that, open the top with caution [so not to inhale] the vapor, and leave until it cools off and the vapor is gone; strain, transfer into a vessel, and use according to our description.

Another method could be used for the extraction of its 'duhn' as follows: Cast [the snakes] into the boiling water and cook until they come apart. Then collect the 'duhn' from the top of the water and store. When need arises for it, mix this 'duhn' with a convenient portion [of the 'duhn'] of sesame and use, for it is much stronger—God the almighty willing.

The 'Duhn' of Flying Ants.—Take a thousand flying ants and macerate in one 'ratl' of the 'duhn' of white lily, suspend in the hot sun for two weeks and anoint with it.

*The 'Duhn' of Henbane (*hyoscyamus*).*—The method of extracting its 'duhn'³⁾ is in this manner: Take some of the newly dried white

¹⁾) *Balsamodendron opobalsamum*. See Dioscorides, *Materia Medica*, Arabic Version, 27-9, and English version, ed. by Robert T. Gunther (New York, 1959), 18-19.

²⁾) Dioscorides, *Materia Medica*, Arabic version, 77. Gunther's English version, 53.

³⁾) Al-Zahrāwī preferred the seeds of *Hyoscyamus alba* because certain of its qualities were not equally attributed to *Hyoscyamus niger*. (Simon Morelot, *Nouveau Dictionnaire Général des Dragues* (vol. I, Paris, 1807), 742-3). On *Hyoscyamus niger* and *alba* and their uses in the Middle Ages, the

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parts of henbane, pound and knead with hot water. Then put in the sun, and what dries is mixed again with the rest repeatedly until it becomes black and soft. Press in a thick woolen cloth, collect the 'duhn' gently, put in a container and store.

The 'Adhān' that are Compounded from Simple Drugs—*The Duhn of Rose*.—There are several kinds of 'duhn' of rose. The methods of its manufacture are many, some old and some new, and its benefits are also numerous. The old methods of manufacturing which we mention from Galen and the ancient sages are three. The first, take one 'ratl' of olive oil, which is known as the oil of 'Infaq', or the washed oil known as 'al-Rikābi,' and put it into a vessel glazed inside and outside. Then put four fresh roses over the ratl [of oil] and close the mouth of the vessel and hang toward the sun for forty days. If it is done, strain and store in a glass container. This method of manufacturing is the best of all, the most graceful in essence, and the most penetrating in the bodies.

The second method, however, is to take the same amount of the oil and the roses and hang it ¹⁾ in the well, but not in touch with the water, and leave it there for two months. Then take it out, strain, and store. In this method of manufacturing, the rose odor remains strong in it, but the substance [of the 'duhn'] is slow in its penetration in the bodies, not having the same elegance and penetrating [power] of the first.

The third method of manufacturing is to take the same quantity, but the vessel in which the [material] has to be put is coated with honey from inside. After that you put in the oil and the roses, close the mouth of the container well, and bury it in a pit in the ground and cover it with earth. Be sure it is not in a place where water or any strong humidity could touch it, and leave it there for two months.

But the method of manufacturing the 'duhn' of rose that has been discovered by the people of Iraq is in this manner: Take whole unhusked sesame and spread on a sheet in the shade and putting one layer of it and one layer of roses. Leave for one day and night and then take off the roses. Repeat, adding new roses to it

reader may consult Hermann Fischer, *Mittelalterliche Pflanzenkunde* (München, 1929), 217.

¹⁾ That is to say, after putting it in the container.

and do that a few times until the sesame takes in the roses' odor. [Take this sesame] from which the roses were separated, grind it in a grinding mill, press it, and store the 'duhn'. The best of it is that which had the roses repeatedly layed upon it more than three times. But that to which [roses were applied] fewer times will vary accordingly in the function thereof, [concerning] usefulness and strength.

All this 'duhn' that comes to us [in Arabic Spain] from the East [the countries under the domain of the Eastern Caliphate] is a common [commercial] 'duhn' having only little of the roses' faculty, whereas the faculty of the sesame is predominant, since the roses only have been applied once or twice. Moreover, [this 'duhn'] could be first, second, or third class. The first pressed 'duhn' which comes out is smooth and fragrant; of lesser quality is that which is extracted next; and the third is inferior to the other two. This is because it has thickness therein, and more of the sesame than of the 'duhn' of rose; hence the effect of roses in it is weak. This third class of 'duhn' is called "the wandering" (*al-rāhilin*), because it is sent to other lands and distributed in many countries [for sale]. Here in our midst in Cordova a wonderful and unmatched kind of 'duhn' used to be made on which the roses were applied repeatedly.

This method of manufacturing the 'duhn' is very nice because the sesame accepts the quality of the roses and nothing of its body. Hence, it becomes elegant and more penetrating than all that are [obtained] by other methods. Therefore, whosoever wants to prepare it best let him repeat laying the roses on it (the sesame) five to seven times, and take the top of the first extraction and use.¹⁾

*The 'Duhn' of Myrtle.*²⁾—There are two methods for manufac-

¹⁾ It is possible that al-Zahrāwī used for his "duhn" of rose the species known as *Rosa Damascena*. In Islamic countries rose water was known long before the time of al-Zahrāwī, but we know of no definite description of its preparation in classical writings. The oil of roses spoken of by Alexandrian alchemists, Forbes concludes, is not the product of distillation but of decoction. (R. J. Forbes, *Short History of the Art of Distillation*, Leiden, 1948, 28). Not before the tenth century was distilled oil of roses, using the cucurbit, mentioned by Byzantine authors. In regard to the "duhn" of rose, possibly contributed to the development of the "Enfleurage à froid," which is mainly fats.

²⁾ *Myrtus communis* Linn. See Meyerhof, *Glossaire Maimonide*, 10.

turing because some of it is made of the tender leaves, and some is made of blossoms, that is, the flowers. Now, [for extracting the 'duhn' from flowers] take three 'ouqiyahs' [of flowers]; add to it one 'rūb' of the 'duhn al-Rikābī' and suspend in the sun for forty days, then strain and store.

Another method is to 'rob'¹⁾ with sesame, as we described it in discussing the 'duhn' of rose and the 'duhn' of violet; then express and store. This way of manufacturing it, is the best of all methods, which makes it especially more desirable for admixture with anointing spices worthy of use by kings and men of wealth and luxury.

Of this 'duhn' some is also made of the leaves and is of three kinds:

[1] That is to take a quantity of the tender leaves of myrtle, pound, express, and mix their juice with the oil of 'infāq.' Then cook until the juice is gone and the 'duhn' remains.

[2] Or else, pound well the leaves of myrtle and cook them in water or, even better in syrup, until the water accepts the quality of its ['duhn'], then strain. Add to that water (the filtrate) an equal quantity of the oil of 'infāq' or of the 'duhn' of vinegar and cook until the water is gone, as before, then strain into a glass container.

[3] Or take of the tender leaves of myrtle and macerate in the oil of 'infāq' and put in the sun for forty days until the 'duhn' accepts the faculty of the myrtle.

The 'Duhn' of Camomile.—[*Anthemis nobilis* Linn.] For the manufacturing of its 'duhn,' take the tops of flower-buds, and put over the 'duhn al-Rikābī,' and suspend in the sun for forty days, then strain and store. Or if so desired, it could be made by 'robbing' with sesame and expressing its 'duhn'. It also could be made in this manner: Take the tender, green, undried tops, pound and express them. Then take the juice and add to it an equal part of the 'duhn' of sesame; place over the fire and cook until the juice is gone. Do that repeatedly, for in so far as you add more of the juice to it the resulting 'duhn' will come out stronger, more fragrant and more useful.

¹⁾ "Robbing" with sesame was mentioned under the manufacturing procedures of the 'duhn' of rose, according to the method newly devised in Iraq. Here, of course, the roses are replaced by the flowers of myrtle.

The 'Duhn' of Wormwood. — ¹⁾ For the manufacturing of its 'duhn' take one 'ratl' of the green flowering tops at the prime of their fragrance, and add to it four 'ratls' of the oil 'al-rikābī' or any other oil, and suspend in the sun for forty days, then strain and use.

Also if desired, it could be made into a 'rob' with sesame, as mentioned previously under other 'adhan' (see pp. 105-107).

The 'Duhn' of Daphne Laureola. ²⁾—This 'duhn' is derived from mezereon bark, and in its uses it replaces the 'duhn' of rose. But the manufacturing of its 'duhn' is in this manner: Take one part of the mezereon bark and pound to a soft powder. Then add to it an equal part of the oil of 'infāq' or the oil 'al-rikābī'; macerate three to four days, express and store. If so desired, however, suspend toward the sun, as previously mentioned in other 'adhān.' And if desired, place on the fire for quicker [result] but the sun [method] is more desirable.

The 'Duhn' of Mezereon. — ³⁾ For the manufacturing of its 'duhn', take one 'ratl' of the green Daphne laureola, pour over five 'ratls' of water, and boil until only two 'ratls' remain, and strain. Then pour over it three 'ouqiyahs' of the 'duhn' of sweet almond, cook until all the water vanishes, and store for use when need arises.

The 'Duhn' of Basil. — ⁴⁾ For the method of its manufacturing, take two 'ratls' of the 'duhn al-rikābī' and add over it one 'ratl' of the already pounded basil. Then suspend toward the sun, or add the water to the juice and cook gently, and strain. Thereafter, add 'duhn al-rikābī' on the filtrate, cook until the water is gone and the 'duhn' remains, then strain and store.

The 'Duhn' of Emblic. — ⁵⁾ There are two methods for its manufacture: In the first, take one 'ratl' of emblic and add to it six 'ratls' of water. Cook until four 'ratls' are gone and two 'ratls'

¹⁾ *Artemisia absinthium* Linn. According to H. P. J. Renaud and Georges S. Colin, *Tuhfat al-ahbāb, Glossaire de la matière médicale marocaine* (Paris, 1934, [4]).

²⁾ *Daphne Laureola* Linn. See Meyerhof, *Glossaire Maimonide*, 118, and Renaud and Colin, *Tuhfat*, 119. It is an evergreen spice, which was often used as a substitute for *Daphne mezereum* Linn. (Flückiger and Hanbury, *Pharmacographia*, 540-2).

³⁾ *Daphne mezereum* Linn., see ibid.

⁴⁾ *Ocimum Basilicum* Linn.; see Meyerhof, *Glossaire Maimonide*, 26.

⁵⁾ *Phyllanthus embellica* Linn. or *Emblica officinalis* Gaert. (Euphorbiaceae) Renaud and Colin, *Tuhfat*, 21.

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Then strain and add to it two 'ratls' of 'duhn al-rikābi' or
oil of 'infāq.' Cook until the water is gone and the 'duhn'
remains; then strain and store.

If desired, however, pound and macerate it in the oil and suspend
towards the sun until the oil takes over the faculty of the drug,
then strain and store.

The 'Duhn' of Mastic.—¹⁾ For the manufacturing of its 'duhn,'
take one 'ouqiyah' of the [gum of] mastic, pulverize, and pour over
it one 'ratl' of 'duhn al-rikābi.' Place over a coal fire and stir
continuously until the mastic dissolves, and the 'duhn' accepts its
power, then take down and strain.

If stronger and more odorous ['duhn'] is desired then macerate
one half of an 'ouqiyah' of each of the aromatic rush ²⁾ and of
calamus ³⁾ in the 'duhn' and leave it therein suspended, towards
the sun for several days, then strain and store until need arises—
God the almighty willing.

The 'Duhn' of Melissa.—⁴⁾ For its manufacture take one 'ratl'
of 'duhn al-rikābi' and add to it one-fourth of a 'ratl' of tender
melissa. Close the opening of the container and suspend in the well
for forty days, then strain and store. Yet, if so desired, [suspend]
towards the sun, but that which is suspended in the well is stronger
in fragrance and more odorous, while that exposed to the sun
becomes milder. However, if the melissa were replaced each week,
the resulting ['duhn'] will be much more useful and stronger in
activity.

The 'Duhn' of Styrax.—For the manufacturing of its 'duhn',
take two 'ratls' of the 'duhn' of sesame and four 'ouqiyahs' of the
dry styrax. Cook in a double boiler until the 'duhn' accepts the
faculty and the odor of the styrax, then take down, strain and store
for use. But, if so desired, suspend towards the sun, as we have
described.

The 'Duhn' of Citron.—⁵⁾ There are several methods for manu-
facturing the 'duhn'.

¹⁾ *Pistacia lentiscus* Linn. of the family Anacardiaceae. See Renaud, and
Colin, *Tuhfat*, 112.

²⁾ *Andropogonis schoenanthus* Linn. See *ibid.*, 18.

³⁾ *Acarus calamus* Linn. See Meyerhof, *Glossaire Maimonide*, 164-165.

⁴⁾ *Melissa officinalis* Linn., *ibid.*, 22.

⁵⁾ *Citrus medica* Risso, See Renaud and Colin, *Tuhfat*, 13.

[1] Take a piece of cotton and dip it in [oil of] sesame, then take it to the citron while growing upon its tree and paint it with [the oil each day] for forty days. Then pick [the citron] and press over it a fine silver spoon, with which the 'duhn' gradually will be obtained, and store.

[2] It could also be made in this manner: Take small, aromatic citron tasting like thyme, and pour sesame over it to cover the citron. Then leave until the sesame takes out the faculty of citron, whereupon you replace it with [another] citron. Do that as many times as you wish the potency of the 'duhn' to be, then express the sesame to extract its 'duhn,' and store.

[3] Or if so desired, peel the citron, and take the rind and make it into 'rob' with sesame, then extract [the 'duhn'] and store it.

[4] It [the 'duhn'] is made [as follows]: Take the citron when well ripened, and keep for one night. Then take a smooth-edged shell or a smooth-edged perfume jar made of silver, and strip gently [the skin of] the citron without scratching it, lest a part of the body comes out. When you collect that which is needed, then put it into a goblet already fumigated with fragrant ambergris twice or thrice. [Each time], the 'duhn' is to be transferred from one [already fumigated] container to another. Consequently, the more fumigations that are applied, the more fragrant and potent the 'duhn' will be to aid the brain. Put it later on into a narrow-mouthed bottle and close its opening with wax, and store. This 'duhn' is one of the greatly recommended 'adhān' to be combined with various perfumes worthy to be used by kings and men of wealth and luxury.

The 'Duhn' of Apples.—The method of manufacturing its 'duhn' is like that in manufacturing the 'duhn' of citron, whereby the sweet, tender apples are 'robbed' with the sesame, then the sesame is expressed and used.

Or by taking its rind when tender, then macerate it in 'duhn al-rikābi' and suspend towards the sun until the 'duhn' takes out the faculty of the apples, and then use. God the almighty willing.

The 'Duhn' of Colocynth.—To manufacture its 'duhn' take the pomegranates [fruits] of colocynth,¹) peel off and draw out only

¹) *Citrullus colocynthis* Schrader (family, Cucurbitaceae), a herbaceous perennial found in Spain as well as in North Africa, Syria, and Cyprus.

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the seeds, leaving the fat [pulp] thereof. Then fill in with oil and suspend towards the sun for one month, after which the 'duhn' is strained and stored. Or if hastily needed, then put [the fruits] as they are filled with oil over a fire-heated stove ¹⁾ until the oil warms up, then strain and store. Another method: Take about four 'ratl's' of the juice of green, well-ripened colocynth, and pour one 'ratl' of the 'duhn' [al-rikābī] over it. Then place over the fire and cook until the juice is gone and the 'duhn' remains, then strain and store.

But if green colocynth is not available take the dry, throw out its seed and the rind. Then take one-fourth 'ratl' of its fat [pulp], and add it to one 'ratl' of oil, and cook until the faculty of the colocynth is drawn out; then store for use.

The 'Duhn' of Squirtng Cucumber.—²⁾ The manufacturing of its 'duhn' is done in several ways: One way is to take [the squiring cucumber], pound and take its juice, and add to it equal parts of oil. Then cook until the juice is gone and the 'duhn' remains. Another is to take the squiring cucumber while green, cut and macerate in oil, using twice the quantity that covers it, close the mouth of the vessel and suspend towards the sun forty days or so, then strain and store.

Or else, especially if [the squiring cucumber] is dry, cook in water first, then strain away the water and add [the squiring cucumber] to the oil. Cook until the water is gone and the 'duhn' remains, then strain, and store until the needed time.

The 'Duhn' of Oleander.—³⁾ [It] is useful in [treating] wet scabies, and banishes it completely. It is tested. Take one 'ratl' of the juice of oleander, then add to it one-half of a 'ratl' of the oil of rose ⁴⁾ or oil of 'infāq,' and cook it until the juice is gone and the 'duhn' remains; strain and store. Or it is possible to add wax or fat instead of the 'duhn,' but the 'duhn' is far better. Then apply it [to the

¹⁾ Heated, smooth stones were usually used for cooking, roasting or heating purposes.

²⁾ *Ecballium elaterium* Rich. (Cucurbitaceae). See Meyerhof, *Glossaire Malmonide*, 142.

³⁾ *Nerium oleander* Linn. See ibid., 52.

⁴⁾ All four scribes here wrote "oil" (عُيْن) yet it is clear from the following sentences that 'duhn' is intended.

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body externally as an ointment] and leave for one day and one night; then enter into the bath. Repeat this until the scabies is cured. This 'duhn' also kills the nits wherever found on the body.

Comments

The pharmaceutical excerpts translated above reveal an author who is thoroughly practical and rational in his approach, who is both knowledgeable and evaluative concerning pharmaceutical details. And one hardly can escape the feeling that he brings to his writing long first-hand experience.

Al-Zahrāwī shows his familiarity with methods developed in Islamic lands; but authorities he cites suggest also his acquaintanceship with relevant writings of antiquity, or at least with their content. He refers repeatedly to Dioscorides and to his recommendations concerning certain oils;¹⁾ and he mentions Galen and the recommendations of other classical writers, without ignoring the tradition of his own land.²⁾

The scope of this treatise centers upon products of direct interest for medicinal use, although the author abjures discussing the "adhān" of widely manufactured oils that are known even to the public.³⁾

Noting the careful description of techniques, the warning against inferior grades of "adhān", the comment on proper glassware and other equipment, and attention to cleanliness and accuracy, we can infer how much the pharmaceutical side of medical care had been elaborated in Arabic Spain and that the author himself may have been as much pharmacist as physician. Indeed, most of this twenty-fifth treatise is devoted to matters pertaining more or less to pharmacy.

The author selects his material from earlier writings and manufacturing processes of both the Eastern and Western caliphates. Traces of Paulus of Aegineta also can be discerned. For example,

¹⁾ For example, Dioscorides, *Materia Medica*, Arabic version, 82, 116-117.

²⁾ See al-Zahrāwī's praise of the "duhn" of rose that was made in Cordova. (B2, fol. 396 a-397 b.).

³⁾ Al-Zahrāwī mentions in the text that he does not intend to elaborate upon methods of extracting oils that are widely employed and known, such as the extraction of the 'duhn' of sesame. (W. fol. 19 b.).

Paulus' discussion of olive oil, almonds, and wheat centers around their dietetic properties, as well as their uses in medicine.¹⁾ Unlike al-Zahrāwī he does not mention laurel, and he devotes only a few lines to the therapeutic value of roses.

Al-Zahrāwī seems notably disinterested in alchemy in its relation to medicine, in contrast to the influential al-Rāzī.²⁾

If we look to al-Zahrāwī's famous Eastern contemporary, we see that al-Majūsī gives no attention to methods of manufacturing the "adhān," perhaps depending upon the pharmacists in the Eastern Caliphate to take care of such matters. Like al-Rāzī in his "aqrābādhīn," al-Majūsī in the second part of *al-Malīkī* devotes the entire section on "adhān" to the compounded prescriptions containing them and to their therapeutic use.³⁾

Al-Zahrāwī not only describes the preparation of the "adhān" as such, but in several instances mentions more than one method of manufacture, pointing out which methods are more satisfactory than others and how to obtain a product of good quality. While it is not easy to assess the extent to which he or his associates in Cordova elaborated on traditional techniques, which are so clearly and ably discussed in the twenty-fifth treatise, it can be seen that the author did not hesitate to modify processes when his own experience and observations so indicated.

Furthermore, in the case of adding one simple drug to his "adhān" al-Zahrāwī generally recommends two main methods: First, by suspending the blossoms (or other parts of the plant used in

¹⁾ Paulus Aegineta, *The Seven Books of Paulus Aegineta*, tr. by Francis Adams (London, 1844-7), 1: 121, 135-6; 3: 41, 99-100, §14.

²⁾ Among many chemical matters discussed by al-Rāzī, we mention only a few examples: his description of the cucurbit and alembic in their uses for distillation; maceration and distillation of flowers (without separating the oil from the water); refining of minerals (such as copper, mercury, and sulfur, and their salts), and the application of various alchemical processes (*Forbes, Distillation*, 38, 48).

³⁾ 'Ali ibn 'Abbās al-Majūsī, *al-Malīkī* (vol. 2, Cairo, 1294 A.H. or 1877 A.D.), 585-588. To gain an impression of al-Rāzī's treatment of similar material, the manuscript of *Kitāb al-Hāwi al-Kabīr* in the Cushing Collection at Yale University was examined on microfilm (described in Harvey Cushing Collection of Books and Manuscripts, New York, 1943, P. 6). Likewise, we have checked the Osmania Oriental Publication Bureau edition of *Kitāb al-Hāwi fi't-Tibb*, (Hyderabad, India, 1955-59), based upon the Escorial manuscripts Nos. 807 and 810 and Bahlawari Ms. (سجده).

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medicine) towards the sun in a certain vehicle, or by repeated "robbing" of that part of the plant with sesame for better and more elegant production. Second, by cooking the tender leaves (or other parts of the plant) in water or syrup and extracting the "juice" by cooking it with sesame or by maceration in oil. Other pharmaceutical processes, such as pounding, kneading, and drying, are also employed by the author, as required.

Therapeutic Uses of the "Adhān"

As in the previous part on technology, we shall here present translated samples of the text (Arabic, pages 90 ff.) on therapeutic uses, followed by a commentary.

The [Olive] Oil.—It is not my intention in this treatise to discuss the [olive] oil as a diet but as a drug. For [as a diet] I have mentioned it in detail in my treatise on aliments. Therefore we say that the best kinds of oils are those of sweet-smelling, good taste, free from pungency and acridity, its astringency is apparent, and more inclined to coldness and dryness. This kind is recommended for the treatment of weak organs, and therefore it enters into the ointments that need astringency as well as to strengthen the organs. It is more convenient in manufacturing the 'duhn' of rose than any other. The oil that has been extracted from black, well-ripened olives, humidifies and gives moderate warmth, relaxes, loosens, and stretches the organs, and relieves from fatigue when applied externally as a liniment. Dioscorides in referring to the oil said: 'All kinds of oil are warming and softening to the skin, relaxing to the organs, and if applied externally on the skin they prevent perspiration from coming out of the body's pores. They are a protective to bodies from the fast reach of cold, [help] to weaken the viscous poisons, and assist in bowel movement.' But Dioscorides mentioned this in general, and after thorough examination [Dioscorides' approach] needs more explanation and definition in view of what we have already described concerning the many varieties of oil, [but] to go into such detail would carry us far away from the purpose and scope of this work.

If, however, [one] drinks nine 'ouqiyahs' (three-fourths of a pint) of oil and the same amount of barley water, together with

warm water, it will purge the bowel; and if cooked with syrup and while hot, nine 'ouqiyahs' of it are taken in, it relieves colic caused by excess of thick humors; and [assists] in the emission of worms,¹⁾ and tapeworms from the bowels; and if given in the form of a rectal enema it relieves colic caused by the swelling of the bowels and the obstruction caused by impaction. If old oil is also applied to the eyes it sharpens the sight.

The Duhn' of Bitter Almond.—It is useful in the pains [hyster-algia], retroversion, and the hot tumors of the uterus, hysteria, headaches, earache, ringing of the ear, and it kills the worms generated in it (the ear), helps in liver and spleen obstruction, useful in asthma, nephritis and dysuria. If [the 'duhn' of bitter almond] is mixed with honey, the roots of the lily of the valley, wax, the 'duhn' of henna, and the 'duhn' of rose, then applied to the chest externally, it relieves asthma. Likewise, if it is applied externally to a patient with sclerosis and splenauxē it will be useful. It also removes the marks from the face caused by superfluities of the body, freckles, relaxes facial spasm, and if applied to the tired sight [eyes] relieves perturbation. And if mixed with wine and applied to the scalp it will be useful against wet ulcers and the dandruff therein.

The 'Duhn' of Sweet Almond.—²⁾ The 'duhn' of sweet almond is mild in the middle of the first degree and useful in opening liver obstruction. It is useful in soothing and humidifying the coarseness of the chest and lung, the burning of urination, in dissolving hard tumors, and in relaxing spasm everywhere.

The 'Duhn' of Laurel.—Its faculty is warming, soothing, and it [helps] to widen the opening of the veins. It relaxes the organs, relieves all pains of the organs, as well as the chills, earaches, colds, and headache. If taken internally it nauseates and hurts the one who drinks it. It is specially useful to cold bodies, and assists against itching, chronic scabies, hardening of the skin, and ring-worm caused by salty phlegm if applied in the bath. It also kills worms wherever found in the body, [rids] from nits and lice, washes

¹⁾ This kind of worm is probably ascaris.

²⁾ Al-Zahrāwī indicates that the method of preparing the "duhn" of sweet almond is similar to that of bitter almond (see B2, fol. 393 b.).

out the dandruff, and helps in alopecia and ophiasis. It should be applied the first hour of the day, and at the fifth [hour] the patient takes a bath after washing his head with honey and flour of fenugreek. The patient who applies this 'duhn' should be careful in case the temperament of his head or his whole body is hot.

The best of the 'duhn' of laurel is the kind made of new, green, very bitter, and pungent [laurel seed] which, due to its acridity, purges strongly when one 'dirham' of it is drunk with two 'ouqiyahs' of julep syrup. In that way it can be harmful to the internal organs, although it is useful for dropsy.

The 'Duhn' of Wheat.—It is hot [and] helpful in [stopping] ringworm at the start, if used as follows: Rub the ringworm with coarse cloth until it is almost going to bleed, then apply the 'duhn' on it; repeat the same procedure until it is healed—God the Almighty willing.

The 'Duhn' of Henbane.—It is cold, anaesthetic to senses, and useful in sleeplessness. If used as nose drops it [helps] to relieve headache and nagging headache caused by yellow bile.

[It is useful] also in itching and scabies, and when mixed in vaginal suppositories it relieves the pains of the uterus. It may be applied to nit-beds on the ailing body, and they will be killed. It is also rubbed on the temples to bring gentle sleep, and if a few drops from it are put in the ear it relieves earache.

The 'Duhn' of Caster Oil Seeds.—It is useful in scabies and wet ulcers of the scalp, the swellings in the anus, the closure of the opening of the uterus, the retroversion of the uterus, and the unseemly scars resulting after the healing of deep wounds. Also useful for earache, helps induce menses, purifies the nerves from entangling viscosity, and if taken internally it loosens the bowels and expels the worms from the belly. Also, if it is applied to alopecia it cures.

The 'Duhn' of Mustard.—It is hot and mild, good for chronic cold ailments. It also dries up and purifies moisture, and helps in alopecia, the pains of the joints, paralysis, tremor, ataxia, facial paralysis, and trembling. Furthermore, it helps in the case of a sting from the scorpion and from all creeping creatures except snake bite. If it is applied to the back of the head, after it is shaven with the razor, it helps against forgetfulness, strengthens the memory.

loosens the phlegm which causes that [forgetfulness], and it warms the nerves.

The 'Duhn' of Eggs.—It is good for the pains of the anus and thereof. It is also useful in the earache and toothache.

The 'Duhn' of Daphne Mezereon.—[It is] hot and purges the yellow water (dropsy). For internal use, take two 'dirhams' by weight [mixed] with the latex of mandrake, and it will purge the yellow water of dropsy.

The 'Duhn' of Emblic.—The 'duhn' of emblic is cold and astringent. Its property is to strengthen the stomach and the anus, as well as cure the hemorrhoids. If also applied to the hair it prevents it from falling, strengthens its roots, and blackens it.

The 'Duhn' of Rose.—Before we mention the methods of its manufacture, let us discuss here its uses in general, then we shall describe the methods of its manufacture. I shall also mention in detail and with definition the uses of each kind, to make our description clearer and fuller. Therefore we say that the 'duhn' of rose is one of the best [and] miraculous 'adhān,' and its uses are numerous and important. It is moderately cold and astringent; neither its coldness nor its astringency is noticeable. And neither is its purgative action extremely strong, nor is its constipating [action] powerful. It moves the bowel if a large dose is taken, and it causes constipation if a moderate dose of it is employed. Especially if taken with laxative substances, then it is wanted for purging; but if taken with astringent substances, it causes constipation. It relieves also all pains caused by heat, and if used internally it helps against inflammation of the stomach; and if applied externally it renders the same effect. If it also is added in drops to certain syrups used for hepatitis, gastritis, and colitis, it helps. If taken with washed, fire-toasted psyllium it ameliorates bowel movement caused by strong laxative drugs and bowel excoriation. Likewise, if taken with ewe's milk it helps burning urination and bladder and relieves their pain, as well as it helps in nephritis, nephritis, and in sugar diabetes—the disease in which the patient drinks too much water and quickly passes it. Likewise it acts when applied externally or when mixed with vinegar and poured over the head to calm the headache caused by the glare of the sun, poisons, and hotness of fever and pleurisy. And if mixed with vinegar and applied to

the body it relieves blotch, itch, and scabies. All this should only be done after purging the body. Likewise in the case of a blow on the head resulting in a fracture of the bone wherein the inner skin of the brain appears, pour over the injured head the warm 'duhn' of rose instead of the blood of ray or dove, for it will help to quiet the pain and the hot swelling therein. And if taken with barley broth it helps in the beginning of tuberculosis, lung ulcer, and the consumption caused by dissolution of the main organs. If given as an enema it aids in the excoriation of the bowels and relieves the pain. If injected in the urethra together with certain medicated drops¹⁾ or with women's milk it relieves the burning and excoriation of the penis, and if rubbed externally on the body it assists in profuse perspiration, and if old [ulcerated] abscesses are covered by it the flesh will grow again. If made into an ointment together with the white of a boiled egg and applied to an aching, inflamed eye it soothes [the pain], and if made together with white wax into a cerate and applied to chapped hands, legs, and lips, and to the blains of the nose it helps. Likewise if applied by a piece of cotton on [the place of] an extracted tooth it relieves the pain, and if used as a gargle together with plantain²⁾ it helps in mouth ulceration and thrush. It is also useful if applied alone or with white wax in all sores caused by yellow bile and hot blood, such as erythema, erysipelas and fire burns. The 'duhn' of rose might enter into several [kinds] of troches and ointments that are useful in hemorrhage, and it could be blended with many of the hot, strong drugs employed internally. The physician [seeing] all these numerous benefits, may then compare the few with the many, the exposed with the concealed, and the present with the unseen, and by good conjecture and by use of his own judgment he could arrange things according to their order and worth. What we have mentioned thus far, in regard to the benefits of the 'duhn' of rose, should be sufficient.

¹⁾ Al-Zahrāwī here gives no specific information concerning the composition of these medicated drops.

²⁾ This apparently is the *Plantago decumbens* that grows in Arabia and Egypt and was referred to by several writers in Islam. Flückiger and Haubury (*Pharmacographia*, 490) and Fischer, (*Pflanzenkunde*, 216) refer to several species of this plant.

The 'Duhn' of Marjoram [wild mint].—¹⁾ It is useful in fatigue if applied externally in the sun or in the bath; and if fumigated with or added into poultices it will help in paralysis and facial paralysis. And if used as nose drops it drives out the winds (colds) and helps in cold ailments. And if used as ear drops it quiets the ringing of the ear and resolves the winds in it, particularly if made into a rub together with the ['duhn' of] almond, as it also acts as emmenagogue, and helps in the sting of a scorpion. In the better kinds the fragrance of the marjoram is strong.

The 'Duhn' of Cologynth.—²⁾ It is useful in the cold ailments, and if taken internally it purges much mouldy phlegm and expels the worms and the tape-worm from the bowel; and it does the same if mixed with kamala,³⁾ and applied to the umbilicus. If given as an enema, it helps in colics caused by thick superfluities. And if applied to the head it removes the dandruff and prevents the falling of hair. Also if used as ear drops it relieves the ringing of the ear and kills the worms that generate in it, and if taken on a piece of cotton and applied—while very hot—upon an aching tooth it relieves the pain; and so it takes away all the cold aches wherever they are, if applied on the affected areas.

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Comments:—In his *al-Tasrif* in general, and in this 25th treatise in particular, al-Zahrāwī is not mainly interested in pharmacologic interpretations of why a medicine is administered, as has been maintained.⁴⁾ The views he does express, however, lie within the framework of the humoral theory that came down from classical times and was elaborated upon in Arabic writings. He therefore

¹⁾ The botanical origin of this aromatic plant is the mint family, species *Mentha bulgarioides* Linn., which is common in South Europe and Spain and certain parts of North Africa, besides many other areas. Flückiger and Hanbury, *Pharmacographia*, 486; see also Meyerhof, *Glossaire Maimonide*, 116-7.

²⁾ Apparently it is *Cucumis colocynthis* Linn., judging from the Arabic phrase used by al-Zahrāwī (السازج *Jiblī*); see Meyerhof, *Glossaire Maimonide*, 78; and Dioscorides, *Materia Medica*, Arabic tr., 367.

³⁾ Kamala or kamela is apparently *Roulera tinctoria* (the *Mallotus philippinus*, Müller), a large shrub or a small tree that grows in Arabia, India, and the Philippines and other areas. Its glandular powder is used in medicine. See Flückiger and Hanbury, *Pharmacographia*, 572-573.

⁴⁾ For example, Aldo Michi, *La Science Arabe et son Rôle dans L'Évolution scientifique mondiale* (Leiden, 1938), 182.

speaks of drug therapy in terms of the four humors, and he refers to the Hippocratic qualities of his medications as being hot and cold, wet and dry, and to the Galenic degrees of their quality. In this treatise al-Zahrāwī does not describe the diseases to be treated, but rather he relies upon what he already has mentioned in previous treatises, particularly in the first two.

In several instances al-Zahrāwī recommends practical steps for better therapeutic results in applying the "adhān"; for example, he mentions the form of preparation, and if externally used he indicates whether the "duhn" should be applied before or after bathing, or in sunshine or in shade, and so on. If the "duhn" is to be taken internally, he sometimes mentions the dosage and how, when, and with what the medicine should be administered.

He does not escape the temptation of generalizing the therapeutic effects of certain "miraculous adhān," assuming results beyond what could have been observed. Al-Zahrāwī does usually present such sweeping statements with an indication of specific conditions in which a 'duhn' is more particularly recommended.

In certain cases, he adds details not found in Dioscorides, who no doubt influences him greatly. He asserts gently that Dioscorides has been too general in his presentation of the uses of olive oil in medicine, and has overlooked that there are several kinds of oil that vary in quality. Al-Zahrāwī adds that one should be specific in the presence of such differences, which require consideration inasmuch as they influence the therapeutic effects.

The author was selective in choosing and organizing his material. He first devotes a section to the "adhān" alone, and to their manufacture, properties and medicinal uses. Then he proceeds one step further—as in the case of the "duhn" of rose—to discuss instances when a simple drug should be added to a "duhn" to increase or to improve its quality and therapeutic effectiveness.

In Paulus we do not find such an explicitly organized, detailed and well thought out approach. It seems probable that both Paulus and al-Zahrāwī, in describing a good number of these "adhān"—such as of laurel, almonds, henbane and colocynth—have relied heavily upon Dioscorides.¹⁾

¹⁾ Dioscorides, *Materia Medica*, Arabic tr., 39-41, 82, 367.

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In Islam, both al-Rāzī and especially al-Majūsi were interested, as al-Zahrāwī was, in the use of the "adhān" in medical treatment, but less concerned with the various methods of their preparation. Al-Rāzī on the one hand, gave a thoughtful discussion of the therapeutic applications of certain "adhān" (coconut for example) and was quoted by later authors, such as Ibn al-Bayṭār.¹⁾ al-Majūsi lists a number of these "adhān", and beside each he adds the therapeutic effects.²⁾ He generally emphasized pharmacologic interpretations.

Although al-Zahrāwī copies much from his predecessors, he adds his own observations and experience; and he himself was to be relied upon by later authors. Al-Ghāfiqi, for example, refers to al-Zahrāwī's botanical medicine,³⁾ and Ibn al-Bayṭār quotes him almost verbatim in describing the methods of manufacture and use of the "duhn" of wheat.⁴⁾

Compounded Drugs in the "Adhān"

In poly-pharmacy, al-Zahrāwī follows the trend of his time. His procedure of mixing several drugs into the "adhān" for medicinal purposes has pharmaceutical interest. In numerous instances these compounds include so many drugs that it was then impossible to judge the effect of each individually.

Selected excerpts (Arabic, pp. 94 ff.) have been translated below, which are intended to be representative of this part of the 25th treatise.

The 'Duhn' of Marjoram. — This is useful in hysteratresia, retroversion and tumors of the uterus caused by colds. [It is also useful] in pains and in nausea caused by hysteralgia. Likewise it promotes menses, pushes out the placenta, relieves backache, and sciatica, promotes perspiration and resolves fatigue.

¹⁾ 'Abd Allāh ibn Ahmad ibn al-Bayṭār was born at Malaga in Arabic Spain and died at Damascus in 1248 A.D. He became famous for his valuable botanical works. See his vol. I, pt. 2 of *al-Jāmi'*, printed in Cairo, 1874-5.

²⁾ Al-Majūsi, *al-Maliki*, 2: 121-122.

³⁾ Ahmad ibn Muhammad al-Ghāfiqi was born in suburban Cordova and flourished in the first half of the twelfth century. According to Max Meyerhof ("Arabian Pharmacology in North Africa, Sicily, and the Iberian Peninsula," *Ciba Symposia*, 6 [1944] Nos. 5-6, p. 1869) al-Ghāfiqi was quoted by Ibn al-Bayṭār more than two hundred times.

⁴⁾ Ibn al-Bayṭār, *al-Jāmi'*, I, pt. 2, 116.

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Take one 'ouqiyah' each of: leaves of myrtle, cinnamon of China, marjoram, and thyme; and four 'ratls' of oil. Pound the drugs, then macerate them in the oil for ten to twenty days, strain and store.

A 'Duhn' Prescribed for the Heat of the Stomach Which Has Weakened Its Faculties, Causing Nausea, Heartburn, and Inflammation in It; a 'duhn' Which We Know Is Useful by Experience.

Take one third of a 'ratl' each of the waters of: sour grape, bitter pomegranate, tender myrtle, Rose of Damascus, and tender buckthorn.¹⁾ Put these drugs together with one third of a 'ratl' each of 'duhn' of rose, 'duhn' of violet, and 'duhn' of sweet almond, on a gentle fire, then add two 'mithqâls' (equals 2 6/7 drams) of sandal-wood and one 'mithqâl' of musk. Cook until all water evaporates and the 'duhn' remains, then strain through a cloth, and liberate by the [addition] of two 'dâniqs' (0.25 dram) of camphor, and store. The dosage for internal use is one to two 'mithqâls'. It is also used externally for rubbing the body.

A 'Duhn' Prescribed for Moving the Bowels.—By experience, it helps in colic. Take the blossoms of violet, quince seeds, carthamus seed, linseed, ten 'dirhams' of each, then twenty 'dirhams' of seedless raisins, burless sebeste (*Cordia myxa* Linn.), twenty berries, and ten 'dirhams' of each of caneficer²⁾ and manna. Collect and cook with four 'ratls' of water over a gentle fire until one 'ratl' remains. Macerate and strain, then add to the strained [liquid] half a 'ratl' of the 'duhn' of sweet almond and half a 'ratl' of the 'duhn' of sesame and cook until the water evaporates and the 'duhn' remains. Then take off from the fire and store. Give internally two 'ouqiyahs' with warm water, for it is remarkable as we have described.

A 'Duhn' I Composed for Scabies.—It uproots all kinds of scabies in which every other treatment failed. Take of the juice of fresh laurel one 'ratl' or of the decoction if the juice is not available—although the juice is stronger—and one half of a 'ratl' of each of

¹⁾ This plant used by al-Zahrâwi is apparently *Rhamnus cathartica*, a plant indigenous to North Africa and a great part of Europe. (Flückiger and Hanbury, *Pharmacographia*, 157, and Guigues, *Traitemenit, Glossaire*, pt. 1, p. 18).

²⁾ *Cassia fistula* Linn. (Flückiger and Hanbury, *Pharmacographia*, 221).

the water of celery and liquid styrax,¹⁾ and one fourth of a 'ratl'
of the yellow wax, and one half of a 'ratl' of oil of rose; and if not
possible to obtain oil of rose, then the 'duhn' of rose, and if the
oil of rose is not available, then oil of 'infāq.' Collect all, except
the wax, in a pot and cook until the two juices evaporate and the
styrax and the 'duhn' remain. Then add the wax and boil until it
mixes with the 'duhn', take down and store. Apply it on the scabies,
either in the sun or near the fire. Leave on two days and two nights,
and in the third day go into the bath and wash with wheat-bran
and bean flour, both soaked [previously] in vinegar. Do this a
second and third time, then all the scabies will be gone and nothing
will remain from them on the body.

*The 'Duhn' of Colocynth.*²⁾—Take fifty 'mithqāls' of colocynth,
thirty 'mithqāls' of euphorbia [*Euphorbia resinifera* Berg] and
twenty 'mithqāls' of buckthorn. Crush the colocynth well and
pour over it three 'ratls' of water, and leave it three days. In the
fourth day put it over the fire and pour on it one 'ratl' of the oil,
and cook on a gentle fire until two-thirds of the water is gone and
one-third is left. Then strain gently and throw the lees away.
Put the 'duhn' back in the pot, and when the pulp of the colocynth
dissolves in it put in the euphorbia and the buckthorn, which have
been pulverized and sifted. Then boil and stir well, take off the fire
and store. In case you wish to treat with it ill-smelling excrement
and flatulence in the abdomen, give the patient one 'mithqāl' of
sagapenum³⁾ before bedtime. In the next morning give him another
'mithqāl' with lukewarm water and rub with [the 'duhn'] the soles
of his feet, and between his thighs, for it will remove the excrement
in a wonderful way;⁴⁾ it even purges without the internal use of
sagapenum.

¹⁾ *Liquidambar orientalis*, Müller, or *Styrax officinalis* Linn. (Flückiger and Hanbury, *Pharmacographia*, 271).

²⁾ According to the author this prescription was devised by Yūhannā ibn Māsawayh (777-857).

³⁾ Sagapenum is a gum-resin. According to Flückiger and Hanbury (*Pharmacographia*, 324) it was frequently used in medieval pharmaceutical preparations, and Lane (*Lexicon*, Bk. I, pt. 4: 1389) refers to Persian influence in its introduction into medicine.

⁴⁾ Therapeutic usage of the duhn here included both internal as well as external application.

A Prescribed 'Duhn' for Hair Removal.—Like unto 'al-nūrah'¹⁾ of Ibn Māsawayh. Take one part of the 'qili' (soda ash; potash), two parts of the 'nūrah' and ten parts of yellow arsenic (arsenic trisulfide). Collect them together, pour over them a sufficient quantity of water, and leave for one day; strain; then return [the filtrate] over them again. Repeat this until all the faculty of the 'nūrah' is exhausted. Then take one part of any kind of 'duhn' you desire and from the strained water three parts; cook gently until the water is gone and the 'duhn' remains, then strain into a bottle. If thereafter you need it, whether on a journey or at home, apply it externally, for it removes the hair in not much time. If, however, you wish to get rid of the smell of the arsenic, then throw into it one 'dirham' of safran by weight. Ibn al-Jazzār mentioned that he found this 'duhn' in a writing from the hand of Ishāq ibn 'Imrān [fl. 903 A.D. at Qayrawān] who attributed it to Ibn Māsawayh, while he [Ibn 'Imrān] did not try it.

A Prescribed 'Duhn' to be Rubbed [as a Liniment].—It burns heat into the organ where it is applied. It is used in cold ailments of the joints. Take one 'mithqāl' [1 1/3 dram] of each of pepper castoreum [*Castor fiber* Linn.] and euphorbia²⁾ and two 'mithqāls' of pyrethrum.³⁾ Pound, and add to it one 'ouqiyah' of the 'duhn' of costus,⁴⁾ then rub the organ therewith very well.

The 'Duhn' of Fenugreek.—Take four 'ratls' of fenugreek, three 'manas' of oil—the 'manā' equals two 'ratls'—half a 'ratl' of calamus aromatica, and one 'ratl' of Iraqi edible 'souchet.'⁵⁾ Pound the calamus aromatica and the 'souchet' well, and macerate with the fenugreek in the oil for seven days. Stir several times each day, strain, express the 'duhn' out, and store it.

A Prescribed 'Duhn' Given to Patients in Consumption as a Drink. This is [to be administered] with barley water or the milk of an ass, in the absence of fever and heat. It has been tested and proven by

¹⁾ A depilatory powder composed mainly of arsenic trisulfide and lime; see Hasan 'Abd al-Salām, *Dhakhīrat al-'Ajjār* (Cairo, 1942), 191.

²⁾ *Euphorbia resinifera* Berg. or *Euphorbia officinalis* Linn.; see Ronald and Colin, *Tuhfat*, 111.

³⁾ *Anacyclus pyrethrum* Linn. (family Compositae); see *ibid.*, 134.

⁴⁾ Probably *Schleichera oleosa*, indigenous to the region of Tibet and India.

⁵⁾ *Cyperus esculentus* Linn. (Meyerhof, *Glossaire Malmonide*, 79); a well known simple used during the Middle Ages (Fischer, *Pflanzenkunde*, 192).

Al-Mālik ibn al-Jazzār. Take twenty 'dirhams' of seedless raisins, one hundred fruits of sebestena (*Cordia myxa* Linn.), two hundred fruits of jujub (*Aria* (*sorbus*) *terminalis* Linn.), twenty 'dirhams' of the roots of *glycyrrhiza*, and an equal amount of the Persian *cataarthocarpus fistula*¹⁾ after being thoroughly cleaned. Cook all these in five 'ratls' of water until two and one half 'ratls' remain, then add to it two 'ouqiyahs' of sheep's butter together with one and a half 'ouqiyah' of the 'duhn' of gourd seed. Then cook [again] until the water is gone and the 'duhn' remains, strain and use as needed.

*

Comments.—All through his discussion of the 'adhān' we see that al-Zahrāwī usually points to the areas and diseases in which some simple or compounded 'duhn' is helpful or a cure. Then he presents actual quantitative formulas by weight or by volume, or sometimes even by number if specifying seeds, berries or fruits, accompanied by a careful description of the technique involved in preparing these "adhān" for immediate or future use.

The author mentions a number of the "adhān" that he has tried personally and found commendable. He also presents others that he himself has devised and recommends enthusiastically.

In this part, more than in other parts, al-Zahrāwī has been more specific in mentioning the doses employed for each medication. This is to be expected since several potent drugs are included, sometimes several of them in one formula. Furthermore, he is careful to specify the particular part of the plant used, whether the root, seeds, leaves, or flowers. The major part of the simples used in this treatise are taken from the "plant kingdom," with not much attention to mineral and animal drugs, which the author employs more extensively in the twenty-eighth treatise ("Liber Servitoris"). But the scope of the twenty-fifth treatise is circumscribed by the title itself.

Al-Zahrāwī mentions the authors on whom he has relied in compiling his material. These men include classical, pre-Islamic, and Arabic authors. The latter seem more prominent as sources for al-Zahrāwī in this last part than in the two parts of the twenty-fifth treatise previously discussed. One was al-Rāzi, who presents in his

¹⁾ *Cassia fistula* Linn.; see Renaud and Colin, *Tuljat*, 179.

'aqrābādhiñ a great number of compounded drugs for various diseases and many forms of pharmaceutical preparations, such as the "adhān."¹⁾ Al-Zahrāwī was likewise acquainted with the works of a famous physician, Ibn al-Jazzār of Qayrawān (Tunisia today), whom he also copied, with full credit. Other physicians in Egypt, North Africa and Spain influenced al-Zahrāwī, whereas, al-Majūsi, his contemporary, depended more on the classical writers and upon al-Rāzī and other physicians of the Eastern caliphate, where he lived. Yet in his section on compounded "adhān," al-Majūsi described only sixteen of them, less than one-fourth the space devoted to them by al-Zahrāwī. Nevertheless, in comparing some of the "adhān" mentioned by both writers we find similarities that suggest common sources, which go back in most cases to classical authors.

Viewing this treatise in general one may conclude: First, the material compiled by al-Zahrāwī was systematically organized in a lucid way. Second, the sources of information from which al-Zahrāwī drew his text were extensive. Third, he was a keen observer and a careful and concise writer, who described intelligently the practical aspects of pharmaceutical topics. In several cases he modified a procedure and added his own observation or experience. Fourth, al-Zahrāwī's major concern—as stated in his introduction to the whole *al-Tasrif*—was to provide the practitioner or the student with a manual of such wide scope, yet so concise and practical, as to serve the health professions in dealing efficiently and promptly with the problems of the individual patient.

¹⁾ See W. fol. 41 a., 49 b., and 58.

CHAPTER SEVEN

CONCLUDING REMARKS

In the early decades of the tenth century Arabic Spain had been absorbing the intellectual output coming from the East and from North Africa ("al-Maghrib"), including much of the Greek legacy in the health field, which was being intertwined with Arabic additions. The country was progressing socially, economically and educationally, under a stimulus from its greatest ruler thus far, al-Nāṣir (912-61). Shortly after the middle of the century the major part of Dioscorides' *Materia Medica* was translated into Arabic at Cordova and soon became available for use in this new version. Then and soon afterward several works in the health field and other areas of learning were written by eminent physicians of the second half of the century. No longer was Spain in a heavily dependent state intellectually.

Al-Zahrāwī came upon the scene during this most favored time in the history of Arabic Spain. He felt the need for a work embracing the major aspects of the health field, to fill a gap in the literature then available in the Western Caliphate. This work was to be designed as a single, practical, encyclopedic source that the student of medicine as well as the practitioner could turn to for guidance, instruction and advice. Probably about the close of the tenth century, al-Zahrāwī's long experience and work and study were turned to meet this need resulting in his famous *al-Taṣrif li man 'Ajiza 'an al-Ta'lif*.

AL-ZAHRĀWI AND HIS WRITINGS

Al-Taṣrif is the only literary contribution known to be written by al-Zahrāwī, and it alone established his fame in the history of the health field through the centuries. His prestige rose high in Spain, in North Africa and the Eastern Caliphate, but still more notably later in Western Europe.

Al-Zahrāwī wrote his work with enthusiasm and with care. He realized the need this work would help satisfy, and he met it effectively in at least three respects.

First, by his advice and careful suggestions he showed his keen interest in promotion of the health professions and in his students and other practitioners who would use his work.

Second, by his description of apparatus and his techniques and approaches, he revealed deep understanding of what he was doing and presenting.

Third, he pronounced his devotion to his profession in presenting the best that the arts of healing could offer the patient at his time. Hence, he recommended the best of care, medication to be prepared and stored under the best possible conditions, the safest methods for administering medicines and diets, and conformity with the best principles of the profession then known.

Through the approach used here to analyze *al-Tasrif*, it will be apparent what a wide scope and rational appreciation al-Zahrāwī gave to this work, a level of pharmaco-medical authorship that hardly was achieved in Arabic Spain before his time. This tends to establish al-Zahrāwī as a peer of the eminent contributors to the health field in the Eastern Caliphate. Although the author recognized his debt to earlier and contemporary Arabic writers, yet the organization, style, many personal observations, drawings, and experiments appear to be his own.

AL-ZAHRĀWI AND THE HEALTH FIELD

In *al-Tasrif*, the author studied and discussed the various areas embraced by the health professions as then known.

As a physician, he studied diseases and their classification, diagnosis and prognosis, considered the importance of anatomy, temperaments, meteorology, and discussed means of preventing disease, promoting health and relieving pain.

As a surgeon, he did what no other Arabic surgeon did before him in presenting his surgical treatise in careful detail, enriched with beautiful illustrations of the instruments he used. In depicting and describing these instruments for instructive purposes he probably stands as the first in the history of surgery.

As a "pharmacist," al-Zahrāwī surpasses all expectations, in view of the previous historical literature. His elaborate discussion of forms of medication, technique and apparatus well deserve our attention and respect. A look into the table of contents of *al-Tasrif*

CONCLUDING REMARKS

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reveals the space and the number of treatises al-Zahrāwī devoted to studies pertaining to the field of pharmacy, and some of these interesting aspects have been here presented. Especially have we examined the "adhān" of the twenty-fifth treatise, which is almost unremembered in printed literature. Indeed, except for al-Zahrāwī's twenty-eighth treatise (the famous *Liber Servitoris*), little has been known of his place in pharmacy; yet we have shown that a majority of the thirty treatises in *al-Tasrif* are pharmaceutical or related to the subjects of pharmacy, which places the work in a new historical light. The author himself, however, repeatedly emphasized his interest in pharmaceutical preparations and their significance in promoting better medical treatment.

Al-Zahrāwī did not reveal who had the responsibility at this time in Spain for using the rich pharmaceutical knowledge and array of techniques that he describes. He seems to have made no mention of a separate profession of pharmacy or pharmacy shops in Cordova, save certain places where the popular "adhān" or manufactured products used in medicine were prepared. Al-Zahrāwī primarily addresses medical practitioners. We have seen that many such practitioners in Spain (see Chapter I) might be termed physician-pharmacists, who prepared medicines and devised new forms and "brands" of pharmaceutical preparations, which they then dispensed to their patients. If recognized pharmacists had been serving the health field, one might suppose that the author would have had occasion to mention them. This of course does not rule out the existence of perfumers or spicers called "attārin" (عطارين) (عـ), who were mentioned in his discussion of special standards of weights and measures in the last section of the 29th treatise. But this is not the class of professional pharmacists to which we refer. The present study thus tends to confirm the speculation that no separate class of pharmacists arose in Spain before the end of the tenth century. This is unlike evidence we encounter for the Eastern caliphate, where professionalized pharmacy existed early in the ninth century in an identifiable way.

We are inclined to believe that the extensive instruction, description and information disclosed in the work of al-Zahrāwī may have helped decisively the development of professional pharmacy in Spain, as well as contributing to pharmaceutical progress in general.

APPENDIX ONE

PROPORTIONAL SIZE OF THE TREATISES OF *AL-TAṢRĪF*

To provide an impression of the general order of magnitude of the individual treatises, the following tabulation has been prepared from comparative examination of available copies. The percentages must not be read literally for reasons explained in Chapter IV (p. 42).

Number of Treatise	Folios in a "typical" Ms. Copy	Approximate magnitude in per cent
1	32	4.3%
2	163	21.7
3	8	1.1
4	9	1.2
5	6	0.8
6	8	1.1
7	7½	1.0
8	8	1.1
9	7½	1.0
10	6	0.8
11	10	1.3
12	8	1.1
13	15	2.0
14	8	1.1
15	6	0.8
16	12	1.6
17	11	1.5
18	14	1.9
19	26	3.5
20	11	1.5
21	11	1.5
22	14	1.9
23	27	3.6
24	8	1.1
25	19	2.5
26	27	3.6
27	58	7.7
28	28	3.7
29	26	3.5
30	156	20.8

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ARABIC MANUSCRIPTS EXAMINED THAT CONTAIN
PART OR ALL OF *AL-TASRIF*

Microfilms of extant Arabic manuscripts varied in their contents from part of a single treatise to the entire work. To allow the reader to detect easily the copies of each treatise eventually obtained and examined during this study and to determine in what particular manuscripts a treatise is found, we furnish the following table:

Abbreviations: Numbers 1 to 30 = treatises of *al-Tasrif* one to thirty
(Ine.) = Incomplete
Fol.tr. = folios transposed

1	2	3	4
Bank. 16	Bank. 16	Bank. 16	Bank. 16
Bes. 502	Bes. 502	Bes. 502	Bes. 502
Bes. 503	Bes. 503	Bes. 503	Bes. 503
Sch.	Sch.	Sch.	Sch.
Madr. 5007	Madr. 5007	Taym.	Taym.
Taym.	Taym. (Ine.)		
Wien 476 B	Wien 476 B		
	Len. (Ine.)		
	Par. 6208 (Ine.)		
	Rab. 635 (Ine.)		
5	6	7	8
Bank. 16	Bank. 16	Bank. 16	Bank. 16
Bes. 502	Bes. 502	Bes. 502	Bes. 502
Bes. 503	Bes. 503	Bes. 503	Bes. 503
Sch.	Sch.	Sch.	Sch.
Taym.	Taym.	Taym.	Taym.
		Rab. 1427	Rab. 1427
9	10	11	12
Bank. 16	Bank. 16	Bank. 16	Bank. 16
Bes. 502	Bes. 502	Bes. 502	Bes. 502
Bes. 503	Bes. 503	Bes. 503	Bes. 503
Sch.	Sch.	Sch.	Sch.
Taym.	Taym.	Taym.	Taym.
13	14	15	16
Bank. 16	Bank. 16	Bank. 16 (Ine.)	Bes. 502
Bes. 502	Bes. 502	Bes. 502	Bes. 503
Bes. 503	Bes. 503	Bes. 503	Sch.
Sch.	Sch.	Taym.	Par. 5772
Taym.	Taym.	Tub. 782	Tub. 782

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17
Bank. 16 (Inc.)
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78²

18
Bank. 16
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78²

19
Bank. 16 (Fol. tr.)
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78²
Vat. (Inc.)

20
Bank. 16 (Fol. tr.)
Bes. 502
Bes. 503
Seh.
Par. 577²
Vat. (Inc.)

21
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78³
Vat. (Inc.)

22
Bank. 16
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78³

23
Bank. 16 (Fol. tr.)
Bes. 502
Bes. 503
Seh.
Par. 577²
Tub. 78³
Vat. (Inc.)

24
Bank. 16
Bes. 502
Bes. 503
Seh.
Wien 211D.

25
Bank. 16
Bes. 502
Bes. 503
Seh.
Wien 211D.

26
Bank. 16
Bes. 502
Bes. 503
Seh.

27
Bank. 16
Bes. 502
Bes. 503
Seh.

28
Bank. 16 (Fol. tr.)
Bes. 502
Bes. 503
Ali.
Vel.

29
Bank. 16
Bes. 502
Bes. 503
Ah
Vel.
Leid. 13 (Inc.)
Br. Mus. (Inc.)

30
Bank. 17
Bes. 502
Bes. 503
Ali
Vel.
Tub. 91
Wien 476A
Esc. (Inc.)
Par. 2953 (Inc.)
Rab. 1427 (Inc.)

An annotated bibliography of the above manuscripts, important to those seriously interested in the sources, will be found beginning on page 137.

Other Known Arabic Manuscripts.—

We know of other extant Arabic manuscripts of parts of *al-Taṣrif*, which have not been microfilmed either because they are not pharmaceutical (hence lie outside our main field of competence) and are already available in more than three copies; or because they could not be photographed despite repeated efforts.

Since we know of no modern information on *al-Taṣrif* manuscripts presented systematically elsewhere, we report these additional manuscripts below, as a matter of information and as a stimulus to further search and research.

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APPENDIX THREE

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ARABIC MANUSCRIPTS OF *AL-TASRIF* KNOWN BUT
NOT EXAMINED

Since manuscripts here charted have not been examined, the information drawn from the literature and correspondence may not all be as reliable as in Appendix 2. The table offers a ready key to determine which manuscripts reportedly contain a particular treatise. (A key to the manuscript abbreviations was presented on pages x-xi).

	2	28	29	30
1 Madr. 2008-30 (Inc.?) Mrk. 404	Madr. 2008-30 (Inc.?) Mrk. 404	Mrk. 21 (Inc.) Mar. 42 (Inc.)	Mrk. 21 (Inc.) Mar. 42 (Inc.)	Got. (Inc.) Hunt. Leid. 2540 Mar. Top. Par. 6461 Par. 6824 Par. 2953 Mrk. 21 (Inc.) Bodl. Or. 491 (Inc.)

The above manuscripts (not consulted) have been listed in a separate section of the Bibliography (beginning page 144), with descriptions and comments to the extent that available information permits.

APPENDIX FOUR

GLOSSARY

Quite a few terms and transliterated words that required immediate explanation were briefly defined as they occurred in the text or in footnotes. More common expressions that could be easily found in a dictionary were used without interpretation. The following list will then include some additional terms that occur repeatedly in the text and that the average reader may not easily find explained fully elsewhere.

A.H.—After the "Hijrah" (immigration of Mohammed from Mecca to al-Madinah), which commences the Islamic era (starting 622 A.D.) and follows the lunar reckoning. For more precise dates (not only to the year, but to the month and day) we consulted the conversion table by Louis Ma'lūf, *al-Munjid fi al-Lughah wa al-Ādāb wa al-‘Ulim* (15th ed. rev., Beirut, 1956) between pp. 820 and 821. See also Giuseppe Gabrieli, *Manuale* (Pt. 2, Rome 1916), 358-380.

'Abbāsid dynasty (750-1258 A.D.)—Arabic dynasty with its seat in Baghdađ—save for short intervals—after its founding by Caliph al-Mansūr in 762. Among other distinguished caliphs of this dynasty are Hārūn

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al-Rashid (reigned 786-809) and his culturally enlightened son al-Māmūn (813-833). The dynasty fell under the barbaric invasion of the Tartar in 1258.

Agaric—(Arabic عَرْيَق) known also as white agaric, *Polyporus officinalis* Fries. The part of the plant generally used is the dried fruit body after removing the outer rind.

Alembic—A cap (with one or more spouts) to cover the still used in this period, serving as a condenser. The word is coined from the Arabic "al-Inbiq" (الإنبiq), which in turn is derived from the Greek "ambix," a cover or a cap.

Antidotarium—This term was generally used before the advent of the official pharmacopoeias to signify a treatise or a formulary on simple and compounded medicines, their forms, uses, and therapeutic virtues.

Aqrabādīn—This Arabic term corresponds with the Latin "antidotarium," q.v.

"Bāb"—Section of a large Arabic work, such as *al-Taṣrīf*. These works were usually divided into treatises; and the treatise or "maqālah" (مُقاَلَة) into sections; and the section or "bāb" (باب) into chapters or "fusūl" (singular "faṣl" (فصل)).

Barberry—*Berberis vulgaris* Linn. is also known as Oregon grape root and Rocky Mountain grape, including several species. The part used in medicine is the dried root.

Bougies—A form of suppositories mainly for introduction into the urethra. The word is also applied to types of suppositories for the rectum, ear, and nose.

Ceruse—(Arabic سِيدَاج او سِيدَاج) is the basic impure powder of lead carbonate or white lead, used chiefly as pigment.

Colocynth—The fruit of the wild gourd, known also as colocynth apple, colocynth pulp and bitter apple. The botanical origin is *Citrullus colocynthis* Schrader. The dried pulp of the fruit is used in medicine as a bitter laxative.

Confection—A soft medicated mass, pleasantly flavored and mixed with honey or sugared fruit juice to be eaten or dissolved in the mouth. "Confection" is a form no longer recognized officially, but in a sense it is a precursor to our modern cherry and apple-flavored drugs and medicated candies. It is hard to draw a line between confections on the one hand and conserves and electuaries on the other. The term "confection" also has been applied to certain dry drugs (as powder mixtures to be made into electuaries) and as sweet troches and tabulae ("solid confections").

Conserves—A preserved confection in sugary paste or a medicated sweetmeat, often made from finely cut herbs mixed with powdered sugar.

Cumin—Aromatic, carminative seeds of umbelliferous plants, *Cuminum cyminum* Linn., indigenous to North Africa.

Decoction, Aromated—(al-nakhānikh, النخانخ). A drug or combination of drugs prepared by boiling, then aromated with flavors and spices to make it effective and more agreeable to the taste. In the medieval sense a "decoction" implies cathartic action.

*Dabū (pl., *Adhān*)*—See chapter VI, p. 77.

Electuary—A medicinal preparation in which the ingredients are usually compounded with honey or syrup in the form of a paste or a confection.

Euphorbiatum—The dried latex obtained from the stem of *Euphorbia resinifera* Berg (Fam., *Euphorbiaceae*) by incision. It is a plant indigenous to Morocco and is mainly used as a purgative and emetic.

Fermentation—This term is to be understood here as the change that certain compounded drugs undergo when left standing in contact with air for a time. The change was then not understood, however.

Hieras—A class of medicaments in which the dominant bitter simples, such as aloes, are modified or disguised with aromatics and spices. Enjoying the reputation of panaceas, they were sold on a wide scale as secret preparations (nostrums) in the classical period. They enjoyed increasing demand during the Arabic period.

Humors—The four fluids of the body: blood, phlegm, yellow bile and black bile. According to the Hippocratic and Galenic concept, the harmony or equilibrium among these four humors results in good health, while illness is the outcome of disharmony or imbalance among these body fluids.

Hypoxistis—The juice and extract of various species of *cytinus* used as an astringent.

Ibn al-Bayṭār, Diyā al-Dīn Abd Allāh ibn Ahmad—Born in Malaga, Spain in 1197, he acquired his early education there, then travelled extensively. He served the Ayyubid King, al-Malik al-Kāmil and his son, al-Malik al-Sāliḥ, and was appointed chief of the herbalists and sellers of drugs in all Egypt. He died in Damascus in 1248. His famous *Kitāb al-Jāmi'* contains a comprehensive list of drugs (over 2000) that was influential in the late Middle Ages. In it, besides his personal observations, he relied heavily upon classical and Arabic writers such as Dioscorides, Galen, al-Rāzī, al-Majūsi, Ibn Sīnā and al-Ghāfiqī. He also incorporated various passages and phrases from *al-Taṣrīf*, particularly from the chapters on distillation, "al-Adhān" (see chapter six), and weights and measures (See H. Sauvaire, "Arab Metrology. V. Traité sur les Poids et Mesures par Ez-Zahrawy," *The Journal of the Royal Asiatic Society of Great Britain & Ireland*, 16 (1884): 496).

Julep—A sweetened mixture or drink, made from various medicinal preparations that were usually kept in the form of a dough.

Kinnāsh—A compendium on medical therapy, or drug preparations and forms, and methods of administrating drugs. It is derived from the Syriac language.

Lohochs (looches); Arabic چل from the verb لَعْنَى—As the name suggests, this medication is to be taken by mouth in a spoon or in a quantity similar to that taken by spoon. It was often made by mixing powdered drugs with sugar, syrups or honey, to a consistency between that of a thick syrup and an electuary. Lohochs were administered to soothe and cure cough and chest ailments. Ingredients varied greatly, but generally included mucilaginous fruits with honey, almond oil and the like.

Majūsi, 'Alī ibn 'Abbās al-—A famous physician who lived and practiced his profession in Persia during the tenth century. His *Kāmil al-Sīnā'ah al-Tibbiyyah*, known as *al-Maliki* (transliterated also *al-Malaki*), was

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highly praised in Arabic medicine as the authoritative work before the appearance of *Kitāb al-Qānūn fi al-Tibb* of ibn Sīnā in the first half of the eleventh century.

Maqālah—A treatise within a larger work; see under "bāb."

Melilot—A fragrant leguminous herb allied to the clovers (hart's clover) used in plaster or ointment.

Morel—Garden nightshade; a kind of cherry.

Nenuphar—White water lily. The yellow type is called yellow pond-lily.

Plantain, *Plantago psyllium*—the seeds of which are used as a mild laxative in medicine.

Polypharmacy—The fashion of administering many simples and drug preparations together as a single medication. This practice was well known in classical writings, but much expanded in the Arabic period in spite of the fact that many wrote against it.

Rāzī, *Abū Bahr Muḥammad ibn Zakariyyā al-* (864-932?)—Probably the greatest clinician in Arabic medicine. He was an independent thinker and a prolific author whose writings influenced both later Arabic writers and physicians as well as medical development in Western Europe in the Middle Ages. During his career he became the director of the hospital in his home town, al-Rayy in Persia, and of the great hospital in Bagdad.

Rob—(Arabic *rubb* رُبْ or *rubūb* رُبُوب). A medicated jelly of fruit. The inspissated juice of ripe fruit, with or without honey or sugar, is boiled to the consistency of a conserve. Al-Zahrāwī also used robs as vehicles instead of honey for blending medicines.

Sal ammoniac—Known also as muriate of ammoniac. In modern chemical nomenclature it is ammonium chloride. It was first made from burning animal excrements.

Scammony—An inspissated sap, of bitter and acrid taste, obtained from the roots of *Convolvulus scammonia* Linn., a plant indigenous to the Eastern Mediterranean that is used as a purgative in medicine.

Theriac—Used first as an antidote against poisons of wild beasts. Later it was regarded as a general panacea but primarily as antidote. Certain theriacs contained a vast number of simples, including the flesh of serpents, and carried a tremendous reputation for centuries.

Umayyad dynasty—The Umayyad dynasty, with its capital at Damascus, first was founded by Caliph Mu'awiyah I in 661 A.D., and was overthrown by the rise of the 'Abbāsid dynasty in Iraq (750). Second, the Umayyad dynasty with its capital at Cordova, in Arabic Spain, was founded by a scion of the fallen Umayyads in Syria, 'Abd al-Rahmān I (reigned 756-788). From 929 to 1031 it was known as the Western Caliphate.

Vinegar Syrup—(*sakanjabīn*; سکنجین). Mainly a mixture of vinegar and honey with which other medications are blended. It is similar to the later oxymel preparations. See Friedrich Dieterici, "Die Abhandlungen der Ichwan Es-Safa in Auswahl," in *Die Philosophie der Araber im IX. und X. Jahrhundert nach Christi*, series no. II, (vol. I, Leipzig, 1883), 175.

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I. MANUSCRIPTS OF AL-TAŞRIF

a. Arabic Manuscripts Obtained and Examined

All. The Ali Emiri Arabi manuscript No. 2854 is in the "Şüleymaniye Ümumi Kutuphanesi" at Istanbul, Turkey. It contains the twenty-eighth treatise to the thirtieth inclusive, in elegant Naskhi script, with beautiful illustrations to the twenty-eighth and the thirtieth treatises.

الكتاب العاشر والثلاثون في اصلاح الادوية . قال المؤلف

Incipit, It was written not later than 1177 A.H. (1763 A.D.), a date that was inserted in the first folio of the manuscript, apparently a date of purchase. The scribe is Ahmad ibn Muṣṭafā. Number of folios is 138, with 31 lines per page.

Bank. 16.

The Bankipore manuscript No. 16 in the Khuda Bakhsh O.P. Library, Patna, India, contains twenty-seven treatises (lacks 16, 21 and 30), of which a few are incomplete and partially defective. It is written in both ordinary and superior Maghribi script and probably by more than one copyist. On the first folio are inscribed religious aphorisms attributed to a certain al-Shaykh al-Murtadī, and a few verses praising the contributions of the physician and the teacher who are always willing to help more when they are well treated.

جَهِّنْكُمْ أَهْدِي بِأَنْ يَنْهَا مَوَارِرُ الْخَيْرِ وَجِئْنَكُمْ بِضَارَةُ الشَّيْءِ .

Incipit Fol. 2a reads

This is followed by the introduction, then the table of contents. The last folio contains a later official report that has nothing to do with the text.

The manuscript is dated 1121 A.H. (1710 A.D.). The number of folios is 494, and the majority of pages has 35 lines each. *)

Bank. 17.

Bankipore manuscript No. 17 is also located at the library mentioned above in India. It contains the surgical treatise, including the beautiful illustrations of instruments. Only a few chapters are missing.

قال ابيكم المتأصل خلف بن عباس الزهراني واضح هذا الكتاب ، لا اكلت

Incipit, It is written in elegant Naskhi script in large letters. ... لكم يا بن ... It is written in elegant Naskhi script in large letters. The last folio contains aphorisms attributed to al-Zahrāwī. The copy was completed Muḥarram 7, 584 (1189 A.D.), and as such it is the earliest dated manuscript of this part of *al-Taşrif* known either to us or to Ahmad Maulavi

*) We are indebted to the Smithsonian Institution and to our colleague S. A. Ali of the Institute of Universal Medicine for their cooperation in obtaining microfilms of the two manuscripts from India (Bank. 16 and 17) after much difficulty encountered in securing them.

Azimu al-Din, (*Catalogue of the Arabic and Persian Manuscripts in the Oriental Public Library at Bankipore*, vol. 4. Calcutta, 1910, 28-36).

Number of folios is 240, with 16 lines in each page.

Bes. 502.

The Beşir Ağası manuscript No. 502 is located at Süleymaniye Umumi library in Istanbul, Turkey. It contains the entire work of *al-Tasrif*, and is written in beautiful Persian Naskhi script with no glosses on the margins at all.

Incipit, **الله اولا من كتاب التصريف من عجز عن التاليف** Unfortunately the scribe does not give his name, but he states that he completed copying the manuscript as of 18 Ramadān, 902 A.H. (1496 A.D.).

Number of folios is 570, with 33 lines per page.

Bes. 503.

Beşir Ağası manuscript No. 503 is located in the same library mentioned above. It contains likewise all thirty treatises of *al-Tasrif*, but there are several defects and a few folios missing. It is written in a different Naskhi, of which there are several types.

Incipit, **الله اولا من كتاب التصريف من عجز عن التاليف** The copying of this manuscript was completed by al-Faqir 'Ubays in 18 Sha'bān, 1115 A.H. (1703 A.D.).

Number of folios is 736, with 33 lines per page.

Br. Mus.

The British Museum Library, London, England, designates this manuscript Additional 19619. According to the Museum's catalog, this fragment of *al-Tasrif* constitutes "folio 243 verso to folio 246 recto," ¹⁾ but we found that this fragment runs only to about the middle of folio 245 recto. The "Epistle of Najm al-Din al-Tusi" follows immediately (fol. 245r.).

This fragment of *al-Tasrif* is the fourth section of the five contained in the twenty-ninth treatise. It discusses the stability of simple and compound drugs ²⁾.

Incipit, **رسالة في اعماق العناصر المفردة والمركبة من تصنيف الزهراوى الاندلسى**

Excerpt, **ولست أشك أن يفأه أكثر رأفة أعلم.** **فمت الرسالة** The handwriting is in a beautiful and legible Persian style of Naskhi script. The headings, subdivision, and names of simples are written in red ink, while the text is in black. No date is given on the fragment itself, but the manuscript of which it is a part bears the date 1103 A.H. (1692 A.D.). The number of lines per page is 20. See Carlos Ricci, *Catalogus Codicium manuscriptorum orientarum* (pt. 2, London, 1871), p. 458, No. 985.

Esc.

The Escorial manuscript Arabe No. 876 is at the "Biblioteca del Monasterio de San Lorenzo el Real de El Escorial," Escorial, Spain. This library is rich in Arabic manuscripts, and was once richer still. Derenbourg reported it

¹⁾ Martin Lings, Assistant Kesper, Department of Oriental Printed Books and Manuscripts, letters dated November 24 and December 11, 1958.

²⁾ Leclerc erroneously referred to it as a part of the twenty-eighth treatise, *Liber Servitoris* (Leclerc, *Histoire*, I: 453).

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in 1055 manuscripts,¹⁾ a small fraction of the several thousand once preserved there. Before partial devastations in the late ninth century and earlier,²⁾ this library contained seven manuscripts.³⁾ Now it holds only one.

This microfilm, received through the cooperation of the librarian and of Dr. Folch of Madrid, shows that the manuscript contains only the first two sections of the thirtieth treatise, with very few of the surgical operations.

عليكم بالزیدون بعون الله . الفصل الاول في علاج III في

Incipit. The folios are numbered and legibly written in beautiful Maghribi script. The folios from 44 to the end are damp-stained, partially defective and not numbered. There is no beginning or end, nor is it dated.

The number of folios is 56 (111 pages, $13\frac{1}{2} \times 20$ cm. each.)

Cod. 13.
The Leiden manuscript Cod. or. 13 (2), located at "De Bibliotheek der Rijksuniversiteit" in Leiden, The Netherlands. This fragment contains the fifth (last) section of the twenty-ninth treatise, written in legible and beautiful Naskhi script. The title reads: **كتاب الأطباء في كتب الأدوية** (Explanation of the Measures and Weights Found in Medical Works in the Various Languages, Arranged According to the Alphabet).

قال الشيخ أبو القاسم الزهراوي رحمه الله

نحمد الله أكيل والأوزان موجودة في

Incipit, It is dated 944 A.H. (1538 A.D.), comprised of folios 431 r. to 433 v. (6 pages), 29 lines each page, 20×30 cm.

This small fragment was examined by Engelmann and Hamacher in the nineteenth century but nothing was published by them on the text.⁴⁾

Ler.

The Leningrad manuscript No. D 169 is housed in the Institute Vostokovengenia of the U.S.S.R. Academy of Science in Leningrad. It carried no title, date, or author's name.⁵⁾

Incipit. **أمراض الماء ستة وعشرون مرضًا تغير مراج**. The manuscript is legible and beautifully written in Naskhi script. It contains a large portion of the second treatise. There are neither headings for chapters nor subdivisions, the whole long text running in one single paragraph from beginning to end.

Number of folios is 323, 23 lines per page, $17\frac{1}{2} \times 30$ cm size.

¹⁾ Hartwig Derenbourg, *Les Manuscrits arabes des Escorial* (Paris, 1884-1941).

²⁾ Muhammad A. Enan, *Decisive Moments in the History of Islam* (2nd. ed. rev., Lahore, 1943), 240.

³⁾ Nemesio Morata, "Un Catalogo de los Ponderos Arabes Primitivo de el Escorial" in *al-Andalus*, 2 (1934), 104-44 and 205-7.

⁴⁾ P. Voorhoeve, Leiden, Letter of June 25, 1958.

⁵⁾ As also reported by Victor Rosen, *Collections Scientifiques de l'Institute de langues orientales du ministere de affaires étrangères* (vol. I, Petersbourg, 1877), 92-8.

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adv. 5007.

The Madrid manuscript Arabe No. 5007 is housed at the "Biblioteca Nacional" in Madrid, Spain. It was brought to Madrid from Toledo, where it was apparently written. The copyist, Yūsuf ibn Muḥammad al-Lawshi (Tal-shi?), carried out the work for the library of the mayor of Toledo. It contains the first treatise and a great portion of the second. The script is Maghribi, clearly and beautifully written.

السفر الأول من كتاب التصريف لـ عز الدين الطالقاني. There is no end, the Incipit, last sentence being left unfinished, thus: *Excipit*, *لَا إِلَهَ إِلَّا اللَّهُ وَبِدِ الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمَاتِ*. This well-kept manuscript¹⁾ starts with the author's introduction, then the table of contents for the entire work of *al-Tasrif*. This is followed immediately by the first treatise. At the end it is dated by the copyist May 1265 A.D.

Number of folios is 253, with 30 lines per page, 19 x 29 cm. size.

Majid Movaghar manuscript.

This manuscript is a private possession of Dr. Movaghar, founder of the Mehr Foundation, Iranian National University, Tehran, Iran. It is written in Naskhi script and contains only the surgical treatise including the illustrations in beautiful colors. Section 3 contains an elegant illustration of a screw, then a view of a pharmacy shop with drug jars and few tools of the apothecary is shown. Since the manuscript dates about 1311 A.D. this illustration seems of some historical significance as it shows how a drug store in Islam would look about this time.

Par. 5772.

The Paris manuscript Arabe No. 5772 is located in the "Bibliothèque Nationale" in Paris, France, and has been referred to by Blochet.²⁾ It contains treatises sixteen to twenty-three inclusive.

يشتمل هنا الجزء وهو الرابع من التصريف على ثمان مقالات. Incipit. The handwriting is legible, in beautiful Naskhi script, but the manuscript must have been touched with dampness. There are scattered glosses on the margin, apparently by the same hand.

The manuscript has been copied by Muḥammad ibn 'Alī ibn Sawdūn al-İbrāhīmī al-Hanafī.

يد محمد بن علي بن سودون الإبراهيمي الحنفي غفرانه ولولاته. The date of the manuscript is Shawwāl the 3rd, 860 A.H. (1456 A.D.).

Number of folios is 181, of 25 lines per page.

Par. 6208.

The Paris manuscript Arabe No. 6208 is also at the "Bibliothèque Nationale" of Paris.³⁾ It contains only a part of the second treatise. The vertical writing on fol. 1b., which is partially defective, lists a number of prescriptions.

¹⁾ Thomas Magallon, Librarian, National Library, Madrid, Spain, letter dated July 3, 1958.

²⁾ E. Blochet, *Catalogue des manuscrits arabes des nouvelles acquisitions 1884-1924* (Paris, 1925), 109.

³⁾ *Ibid.*, 211.

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أجنون الثان من كتاب التصريف للزمراوي رقم ١٤٢
The handwriting is inferior to that of Par. 5772, and probably written
by more than one copyist.

يدل على حوت الطفل علاج جميع ذلك على الجلد
No date is given.

Number of folios is from ١ b. to ٥٩ b.; with ٢٥ lines per page.

2ab. ٦٣٥.

Rabat manuscript No. D635 is at the "Bibliothèque Générale," in
Morocco. It contains a part of the second treatise, starting with the
section on the diseases of the stomach.

كتاب التصريف للزمراوي في أمراض المعدة وعشرون مرضًا في خراج قوايا
The section of the second treatise is followed by the third, fourth and fifth
parts of the second part (the practical) of *Kāmil al-Sinā'ah al-Tibbiyah*
which are the thirteenth, fourteenth and fifteenth treatises of
the entire *al-Maliki* (including the ten treatises of the theoretical part).
The copyist, however, does not mention the name of 'Ali ibn 'Abbas al-
Uqisi, the author of this work.

The manuscript is written in medium Maghribi script, by more than one
copyist, and was not kept properly. It is dated Sha'bān, ٦١٦ A.H. (١٢١٩
A.D.).

Number of folios is ٢٥٣; with ١٥ lines per page, and ١٧ × ٢٤ cm. size.

2ab. ١٤٢٧.

The Rabat manuscript No. D 1427 also in the above mentioned library
contains treatises seven and eight and the first part of the thirtieth, including
some drawings of the surgical instruments.

أنا لـ السـابـعـةـ من كـتابـ التـصـرـيفـ للـزمـراـوىـ Incipit.
It is written in Maghribi
script in a better handwriting and more carefully than the previous one. It
probably was a part of a larger manuscript.

Number of folios is ٢٩; with ٢٧ lines per page.

Suh.

The Sehit Ali Paşa manuscript No. 2020 is located at the "Süleymaniye
Üniv. Kütuphanesi" in Istanbul, Turkey. It contains treatises one to
fourteen and sixteen to twenty-seven inclusive, with a few folios missing or
defective.

رب يسر يا كرم رب حك فاتك خير الرازقين Incipit.
It is written in legible Naskhi
script, and was copied in ٩٤٢ A.H. (١٥٣٥ A.D.) by the scribe Muhammad
ibn 'Ali al-Hanafi al-Azhari.

Number of folios is ٦٠٠, with ٢٩ lines per page.

Taym.

The Taymūr Tibb [medicine] manuscript No. ١٣٧, was donated to the
Egyptian National Library by the son of the late Ahmad ibn Isma'il ibn
Muhammad ibn Taymūr. As indicated in the manuscript it was once owned
by Muhyi al-Dīn Muhammad ibn al-Maghribi. This manuscript contains
treatises one through fifteen inclusive.

كتاب التصريف . جنكيز الله يا بني موارد الحبره Incipit.
It is written in beautiful
Naskhi script in black and red ink. On fol. a and b (preceding fol. ١), the

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brief comment of Ilađi Khalīlah referring to *al-Tasrif* has been repeatedly quoted. Fol. 1 a contains a number of somewhat hard-to-read signatures, comments, and purchasing notes by persons who probably once owned the manuscript.

As in the Madr. 5007 arrangement, the Taymūr starts with the introduction, then gives a complete table of contents for the entire *al-Tasrif*. This is followed by the first treatise. There are a few scattered glosses on the margin in a different and inferior handwriting. These are comments, mainly in the form of headings. Here and there throughout the manuscript are a few defective folios (such as 116 and 212, together with the first and last folios).

According to Saqqā, a pharmaceutical chemist who saw the actual manuscript and secured the microfilm, it probably dates in the thirteenth century.¹⁾

Number of folios is 216, of 31 condensed lines per page.

Tub. 782.

The Berlin manuscript No. Ms. or. quart. 782, is temporarily at the "Universitätsbibliothek" in Tübingen, Germany. It contains treatises fifteen to nineteen inclusive, all in the same handwriting.

incipit. المقالة الخامسة عشر من كتاب التصريف لمن عجز عن الاليف The table of contents for each treatise is listed nicely and clearly before the text. It is written in excellent and legible Naskhi script. A date given at the end of the sixteenth treatise is the year 993 A.H. (1585 A.D.) ([هـ] ٩٩٣ هـ), probably indicating the time of new ownership or selling.

Number of folios is 154, of 19 lines per page.

Tub. 783.

The Berlin manuscript No. Ms. or. quart. 783 is also temporarily at the University of Tübingen. It contains treatises twenty-one to twenty-three inclusive. But the last treatise is apparently incomplete, as the last folios are badly defective.

incipit. المقالة العاشرة والعشرون وهي مقالة خاصة في ادوية الفم This manuscript continues *Tub. 782*, and most probably was written by the same copyist.

The number of folios is 127, of 19 lines per page.

Tub. 91.

The Berlin manuscript No. Ms. or. fol. 91 is presently also at the University of Tübingen. It contains the thirtieth treatise only, with the surgical illustrations in elegant design.

incipit. الحمد لله على نعماته وآله بالصلوة على رسوله وآلته It is written in large legible letters of beautiful Naskhi script, by an apparently eloquent copyist, Hamid ibn Ramadān, who is interested in using rhythmical prose and flowery expressions of praise.

This manuscript—as stated in a gloss—was borrowed by 'Abd al-Rahmān ibn 'Alī ibn al-Muayyid on Friday, 24th of Šafar, 914 A.H. (1509 A.D.).

Excipit, (fol. 241 a). الحمد لله على نعمات الكتاب

Number of folios is 241 (481 pages), of 13 lines per page.

¹⁾ Hasan M. Saqqā, Damascus, Syria, letter dated August 21, 1958.

Vat.

The Vatican manuscript, Borg. Arabico No. 131, is located at the "Biblioteca Apostolica Vaticana" in The Vatican City, Italy. The manuscript is written in a hard-to-read, poor Naskhi script. It contains incomplete or fragmentary parts of treatises nineteen to twenty-one and twenty-three, with many defects, omissions and disorder in folios.¹⁾ The twenty-fourth treatise is mentioned in the table of contents but nothing of the text is actually included. The manuscript has no real beginning or end, and perhaps it was part of a larger one.

صَفَةُ ضِمَادٍ نَافِعٍ مِنَ الْأَسْوَالِ بِوَحْشَةِ رِعْنَاطٍ The folios 26-37 are written by a different copyist. Headings of sections as well as glosses are found in the margin in fourteenth- or fifteenth-century Spanish handwriting. Special comments are observed in the margin of the nineteenth treatise on perfumery and beautifying processes. It seems that these sections have been consulted frequently in the West.

The manuscript contains 38 folios, 18 lines per page, of 18 x 28 cm. size.

Vel.

The Veliyyüdin manuscript No. 2491 is at the "Süleymaniye 'Umumi Kütüphanesi" in Istanbul, Turkey. A microfilm of this manuscript was obtained through the cooperation of Professor A. Süheyl Ünver of Istanbul. It contains the three last treatises, twenty-eight to thirty inclusive.

الْمَالَكَ الْأَبْاَتِيَّهُ وَالْمُشْرِقَهُ فِي اَصْلَاحِ الْاَدْوَى It is written in a good and legible Maghribi script. The scribe states that his copy is from an earlier manuscript that, in turn, was copied from a manuscript read in the presence of the author himself. However, such a claim cannot pass unquestioned as a guarantee of faithfulness to the original. The copyist praises the contributions of *al-Tasrif*, for which sake he took pains to copy this voluminous work (Vel. fol. 228 b).

On an extra folio at the end of the manuscript appears a letter of consolation, meant for a man who unjustly and by force lost some of his wealth. This letter obviously had nothing to do with al-Zahrāwi.

The treatise contains, besides the text, a display, beautifully designed, of the surgical figures.

In 844 A.H. (1437 A.D.) this manuscript was legally purchased by a certain judge named I'lā al-Dīn ibn 'Izz al-Dīn ibn al-Hadīrī for three hundred "dīnārs" of silver in the currency of Aleppo, Syria. It is an indication as to how highly this work was esteemed at that time among those who could appreciate it. Later on in 1175 (1762 A.D.) it was owned by Veliyyüdin (Wali al-Dīn) ibn Muṣṭafā Āghā, whose name it now bears. The date of the manuscript is c. 663 A.H. or 1265 A.D. (see fol. 228 a).

The number of folios is 228 of 20 lines per page, 18.9 x 25.2 cm.

Wien 476 A.

The Vienna manuscript, Cod. N.F. 476 A, is located at the "Oesterreichische Nationalbibliothek" in Vienna, Austria. It is written in poor Maghribi script and introduced by a flowery, pious preface by the anonymous copyist.

¹⁾ Giorgio Levi della Vida, *Elenco dei manoscritti Arabi Islamici della Biblioteca Vaticana, Studie Testi* 67 (Vaticano, 1935), 259.

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It contains the complete surgical treatise, including the surgical instruments crudely drawn in black and red ink.

Incipit, حَدَا يَفْرُقُ وَصْفُ الْرَّاهِفِينَ وَيَفْصِلُ حَدَا الطَّبِيبِينَ There are marginal annotations in larger script. Folios 3 to 5 contain a list of all the chapters of the treatise.

Number of folios 115 (in 229 pages), 20 lines each page, of $7\frac{3}{4} \times 11\frac{1}{4}$ Austrian inches or Zoll.¹⁾

Wien 476 B.

The Vienna manuscript Cod. N. F. 476B, located in the above mentioned library, is not written in the same handwriting as Wien 476 A, although the script is Maghribi also. It contains the first two treatises.

Incipit, قَالَ أَبُو القَاسِمِ خَلْفُ بْنُ عَيْسَى الْأَزْمَارِيِّ الطَّبِيبُ الْمَاهِرُ The text of the manuscript is organized in this manner: First the introduction to the work, followed in fol. 3 b, by a few brief introductory chapters. Third, on fol. 5 a, the complete table of contents of the whole *al-Tasrif* begins, which is followed directly by the first treatise. The text apparently was written by more than one copyist.

The manuscript has been examined by D. R. Kraus of Berlin, and Hermann Lehmann of Freiburg, Saxony in Germany; but as far as we know, nothing has been published by them concerning the text.

Number of folios is 340, $6 \times 8\frac{3}{4}$ Austrian inches in size²⁾ (1 Austrian inch is 2.63 cm.). The number of lines per page varies, and is not always 19 lines as stated by Flügel.

Wien 211D.

The Vienna manuscript Cod. Mixt. 211D also at the "Oesterreichische Nationalbibliothek" contains treatises twenty-four and twenty-five, written in large beautiful Naskhi script. The copyist was Yūsuf ibn Muhammād al-Sharbīnī, a copyist and a surgeon at the Home of Healing, "Dār al-Shifā" (دار الشفاء), in Cairo, Egypt. It was copied in the months of Jamādā I and II of the year 1027 A.H. (May and June of 1618 A.D.). On fol. 1 b, is a paragraph without a beginning in the manuscript, which undoubtedly continues a previous chapter that happened to become separated from the manuscript. The paragraph begins with the following phrase:

ثَانِيَةً وَقَدْ رَفِيقًا وَحْرَكَ الدَّرَا حَتَّى يَصِيرُ فِي قَوْمِ الْمَرْضِ

The manuscript was well preserved. There are several glosses on the margin, perhaps by the same copyist, with catch words as well.

Incipit, الْجَاهِ الْإِلَاهِ وَالشَّرِيفِ فِي الْمَرْأَمِ

Number of folios is 1 b. to 59 b., of 21 lines per page.

b. *Other Known Arabic Manuscripts of al-Tasrif (not consulted)*
Asaf.

Maqalat manuscript was reported by Brockelmann to be located at Asa-

¹⁾ Gustav Flügel *Die arabischen, persischen und türkischen Handschriften der Kaiserlich-Königlichen Hofbibliothek zu Wien* (vol. 2, Vienna, 1865), 525 No. 1458. ²⁾ *Ibid.*, 525-6.

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Sivya Library in Hyderabad, Deccan, India.¹⁾ We are grateful to the State Central Library of Hyderabad for sending a microfilm of this manuscript, File No. 1298. It contains the 30th treatise written in Naskhi script, 130 folios of 15 lines per page, and includes fine illustrations of the surgical instruments.

Bodl. 491.

The manuscript Bodl. Or. 491 in the Bodleian Library, of Oxford, England, consists of folios 102-104, and 107-115. It is not dated and contains only fragments of the surgical treatises of *al-Tasrif*.

Got.

The Gotha manuscript (Arab 1275; Stz. Kah. 969) is at the "Herzöglichen Bibliothek," now the "Landesbibliothek." It contains only a fragment of the surgical treatise, wherein folios 13 to 20 are written by another copyist. The number of folios is 22, of 16 lines per page, and 16 x 21 cm. in size.²⁾

Gran.

The Granada manuscript is at the "Biblioteca de Sacro Monte de Granada Asin Palacios," of Granada, Spain. The Arabic manuscripts housed there have not been completely cataloged yet. There might be more than one manuscript or fragments of manuscript, but we were not able to obtain definite information, except that surgical material from *al-Tasrif* is in Granada.

Hunt.

The Huntington manuscript No. 156 at the Bodleian Library in Oxford, England, contains Part 2 only of the surgical treatise and was referred to and used by Channing.³⁾ According to a letter (April 14, 1960) from Mr. N. C. Sainsbury, Keeper of Oriental Books at the Library, the manuscript consists of 172 folios and is dated 1465 A.D. Sauvaire referred to this manuscript in his study of Arab metrology (1884).

Leid. 2540.

The Leiden manuscript Cod. Or. 2540 is located at the University Library, Leiden, The Netherlands. It contains the second part of the thirtieth treatise together with the surgical drawings.

ابن الاشاف من كتاب الزماري في علم الطب والتشریح
Incipit,

The number of folios is 146 (291 pages) of 17 lines per page, and 16 x 22 cm.⁴⁾

Madr. 57.

The Madrid manuscript Arabe No. Gg. 57 is reported at the National Library of Madrid, Spain. It is said to contain the fifth and last section of the twenty-ninth treatise on weights and measures. It was written in Egyptian Naskhi script in 914 A.H. (1508 A.D.) by 'Ali ibn B. al-Ashrafi.

The number of folios is 6.⁵⁾

¹⁾ Carl Brockelmann, *Geschichte der arabischen Litteratur* (suppl. 1, Leiden, 1937), 425.

²⁾ Wilhelm Pertsch, *Die arabischen Handschriften der Herzoglichen Bibliothek zu Gotha* (vol. 2, Gotha, 1883), 25-6, No. 1989.

³⁾ Johannis Channing, *Albucasis de Chirurgia, Arabice et Latino*, (2 vols., Oxford, 1778).

⁴⁾ P. Voorhoeve, *Handlist of Arabic Manuscripts* (Leiden, 1957), 376.

⁵⁾ H. Sauvaire, "Arab Metrology. V. Traité sur les Poids et Mesures par

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Mar. 54.

The Marsh manuscript No. 54 at the Bodleian Library, of Oxford, England, contains also part of the surgical treatise. On it, together with Huntington Channing based his work.¹⁾ According to Mr. Sainsbury's letter of April 14, 1960, this manuscript consists of 133 folios and is dated 1271 A.D.

Mar. 42.

Mr. Sainsbury reports also that this is the manuscript referred to by Wüstenfeld (*Geschichte*, p. 86) and it contains folios 114-120 of which folios 116-120 include "Tafsīr al-Akyāl Wa-al-Awzān" (تفسير الأكيال والآذان) on explaining the measures and weights.

Mrk. 21.

The Marrākush manuscript No. 21, at the Library of al-Kalāwi, in Marrākush, Morocco, contains, in part, treatises twenty-eight to thirty inclusive. It is written in beautiful Andalusian script, with the surgical illustrations displayed in various colors. It is dated Dhu al-Qi'dah, 610 A.H.? (1213 A.D.). This manuscript is now housed at the general library in Rabat under the number 21 J (ج ٢١). I recently acquired a microfilm copy and found that the 165 folios of the manuscript (each page contains 25 lines) are bound in disorderly fashion. (S.H.).

Mrk. 404.

The Marrākush manuscript No. 404 in the library of the College of Ibn Yūsuf, Marrākush, Morocco, contains treatises one and part of two, and the books of medical classification (الطب) and the causes of diseases (الأمراض) by Yuhannā ibn Māsawayh (777-857 A.D.) who is known in the West as Mesue the Elder (see table 2).

Incipit, اللهم إله رب السالين رب العافية رب العين It was written in beautiful Naskhi script in the year 830 A.H. (1427 A.D.).

Number of folios is 107; with 27 lines per page, of 26 x 17½ cm. size.²⁾

I recently acquired a microfilm copy of this manuscript (S.H.) It is at the general library in Rabat under the number 404 Y (ج ٤٠٤).

Par. 2953.

The Paris manuscript Arabe No. 2953 is located at the "Bibliothèque Nationale" of Paris. It contains the three sections of the surgical part (جراحة), and is written in beautiful Maghribī script. The surgical drawings are elegantly displayed also. It is dated the sixteenth-century. See Maxime Laignel-Lavastine, *Histoire Générale de la médecine, de la pharmacie, de l'art dentaire et de l'art vétérinaire* (vol. 1, Paris, 1936), 506-507.

Number of folios is 112 and page size is 20.5 x 27.5 cm.

Ez-Zahrāwy," in *The Journal of the Royal Asiatic Society of Great Britain and Ireland*, 16 (1884), 495.

¹⁾ Channing, *Albucasis*, 2 vols., Oxford, 1778.

²⁾ 'Abd Allāh al-Rajrājī, Chief Librarian and Curator of "Bibliothèque Générale," Rabāt, Morocco, letters dated October 20, November 24, 1958, May 21 and June 9, 1959.

³⁾ Ibid., letters dated October 20, 1958 and June 9, 1959.

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Par. 6461.

The Paris manuscript Arabe No. 6461 is also located in the above-mentioned library, and contains an extract of the surgical part. Blochet overlooked the fact that the name of al-Zahrāwī was spelled erroneously in the manuscript.

Number of folios is 232.¹⁾

Par. 6824.

The Paris manuscript Arabe No. 6824 is also located in the "Bibliothèque Nationale." It comprises the surgical part, written in Egyptian Naskhi script, and dated in the fourteenth century.²⁾

Top.

The Topkapi Sarayindaki manuscript No. 1000, at the "Ahmet Salis Kütüphanesi" in Istanbul, Turkey, contains the thirtieth treatise, including about 215 elegantly colored surgical drawings.

Incipit قال راشع هذا الكتاب لا اكلت لكم يا بنى هنا الكتاب It was donated to the library by Sultan Ahmad III, the celebrated monarch of the Turkish (Ottoman) Empire.

Excipit, انه يربى سريعا . كل الكتاب يعون الملك الوراء This manuscript was referred to by Süheyli Ünver in regard to the influence of al-Zahrāwī's work on the development of Turkish surgery. Number of folios is 171, of 15 lines per page, 18 × 26.5 cm.³⁾

c. Other Manuscripts Used in This Study

Cushing Manuscript. Part of al-Rāzī's *Kitāb al-Hāwī al-Kabīr* (*the Continens*) in the Cushing Collection at Yale University medical library. This manuscript was secured by Dr. H. Cushing through the efforts of Dr. Sa'eed of Iran; see Jay M. Rasooli and Cady H. Allen, *Dr. Sa'eed of Iran* (Grand Rapids, Michigan, 1958), 152-53 and 159-160.

Damascus Manuscript, No. 7565 contains the first ten theoretical treatises of al-Majūsī's *al-Maliki* and not the practical part; in the al-Zāhiriyah Library at Damascus, Syria.

Osler Manuscripts, Nos 449 and 450 in the Osler Medical Library at McGill University, Montreal, Canada. The first contains part of al-Rāzī's *Kitāb al-Hāwī al-Kabīr* written in Naskhi script. The second has an incomplete copy of al-Rāzī's *Kitāb al-Kunnāsh al-Fākhir* on medicine. This manuscript was purchased from Tehran through the efforts of Dr. Sa'eed of Iran.

Sommer No. A 26 item 2. This manuscript is in the National Library of Medicine, Washington, D.C. It contains al-Majūsī's complete work, *al-Maliki* in its two parts, the practical and the theoretical (twenty treatises).

We wish to extend our gratitude to the above mentioned libraries for their courtesy in allowing us to consult these manuscripts.

¹⁾ Letter from the "Nationale Bibliothèque" of Paris, dated July 17, 1958.

²⁾ Blochet, *Catalogue*, No. 6461.

³⁾ A. Süheyli Ünver, and Hüseyin Usmān, *Meskhur Arab Cerrahi Ebül-kasimi Zekravi ve onun Kitabül Cerrahiyesi* [Istanbul] (, 1935), [1], 4. This publication is an extract of a paper read before the International Congress of the History of Medicine, held in Madrid, Spain, in September, 1935.

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Fig. 15. Strainers used by al-Zahrawi. (See pp. 160-61)

جلس الرعن العجم
المقالة الخامسة والعشرون قال الشيرازي
 إن القاسم خلق بين عباس الفهراري رحمة الله تعالى
 وهذه المقالة تناولت في الأدواء وصناعاتها استعمالها أعلم أن
 وأختلاف صناعاتها وكيفيات استعمالها أعلم أن
 صناف الأدواء في أعمال الطب جلية وفي علاج $\frac{1}{2}$
 الأمراض عظيمه كان الأفضل من الأولى بل يستعملونها
 في علاج الأمراض والتجريح من خارج و بالشرب
 من داخل وهي من داخل وهي تتفسد فتنفسان لأن
 منها ما ينفعه خاصة في الدهن من غير أن يخالطه
 سُجن الأدوية ومنه ما ينفعه بادريته تحالط الدهن
 وذلك الأدوية منها يسيطر عليه ويفزده و منها أدوية
 كثيرة مختلفة فاما الأدواء التي تفتح بقوه خاصة
 فمثل الزيت والشrog ودهن التوزين ودهن اللثه
 للجوز ودهن بزر الكتان ودهن لحمة الخضراء
 ودهن القرص ودهن الحنف ودهن الفخار ودهن
 البندق ودهن اليسان ودهن الفتح ودهن الملح
 ودهن القرع ودهن الشونيز وما أشبه ذلك
 من الأدواء التي تأتي وصنفها فيما بعد وصناعاتها
 وصنافها على مراتبها وفي مواضعها يعلم أستعمالها
 إن شاء الله تعالى وأما الأدوية التي تحالف الدهن

المفردة

Fig. 16. First page of the Twenty-Fifth Treatise. (See p. 161)

المقال في حزق مثقالين مع الماء في العيارة ومع ما لا يحول فتعمد هم صفة
 الدهن الذي كان يغسل به طفلون المتقطيب رطبة الرأس وهو علاج معروف
 يسمى سهر لبس من العلاجات الباع منه يوحى بهلوك ثم تغلب على كل واحد
 أو فيه ميول يرج أو قستان سهاب أو قستان عافر قرحاً لاث أوراق فربون زعيم
 أو زينة أو قيد زنق أو زيت طيب نفحة طالثون عشرة روسن تك و
 العقاد وتفتح خالا العروبون والصلصال للحس في عشرة أيام ثم
 شدده وينثر في عشرة أيام ثم يلقي الدهن على الطلاق وركع على النار في قدر
 عزوج مضاعف حتى يذهب بعده الطلاق ويسقو ويضر العقاد غير ذلك
 ثم يعاد على النار في الفدر والمضاعف وبعده فيه الغربون والصلصال للحس
 ثم يطه حتى يطلع منه منه الطلاق وستي وحدة، ويسقو ويرفع رأسه
 وصحته
 واستعماله لانفك به الرأس في صوضع الدماغ حكم
 لطبقاتي بالشربة تعلم ذلك ثم ينادي أبا عبد الله وعشه لكان ذلك في
 أو شهر فصلن ما يحتاج إليه وإن لم يجد دهن الدهشت فما حمله
 دهن يحصل الموصوف فقل لهما في ما يراه أن شام العيارة
 المقالة الخامسة وأصبر على من كتاب المقربات لغير غير العاليف
 وكل الغرائب من كتبه هذه المقالة تبرم الاستئناف المثار على
 عشر شهر جاد في الآخر من شهر شعبان ثم أعلمه العيادة القطرة
 فنالى يوسف بن محمد ابن محمد الشربي
المرأة بجهنم غادم العقد بيد النساء

مصر
 الحسين

Fig. 17. Last Page of the Twenty Fifth Treatise. (See p. 161)

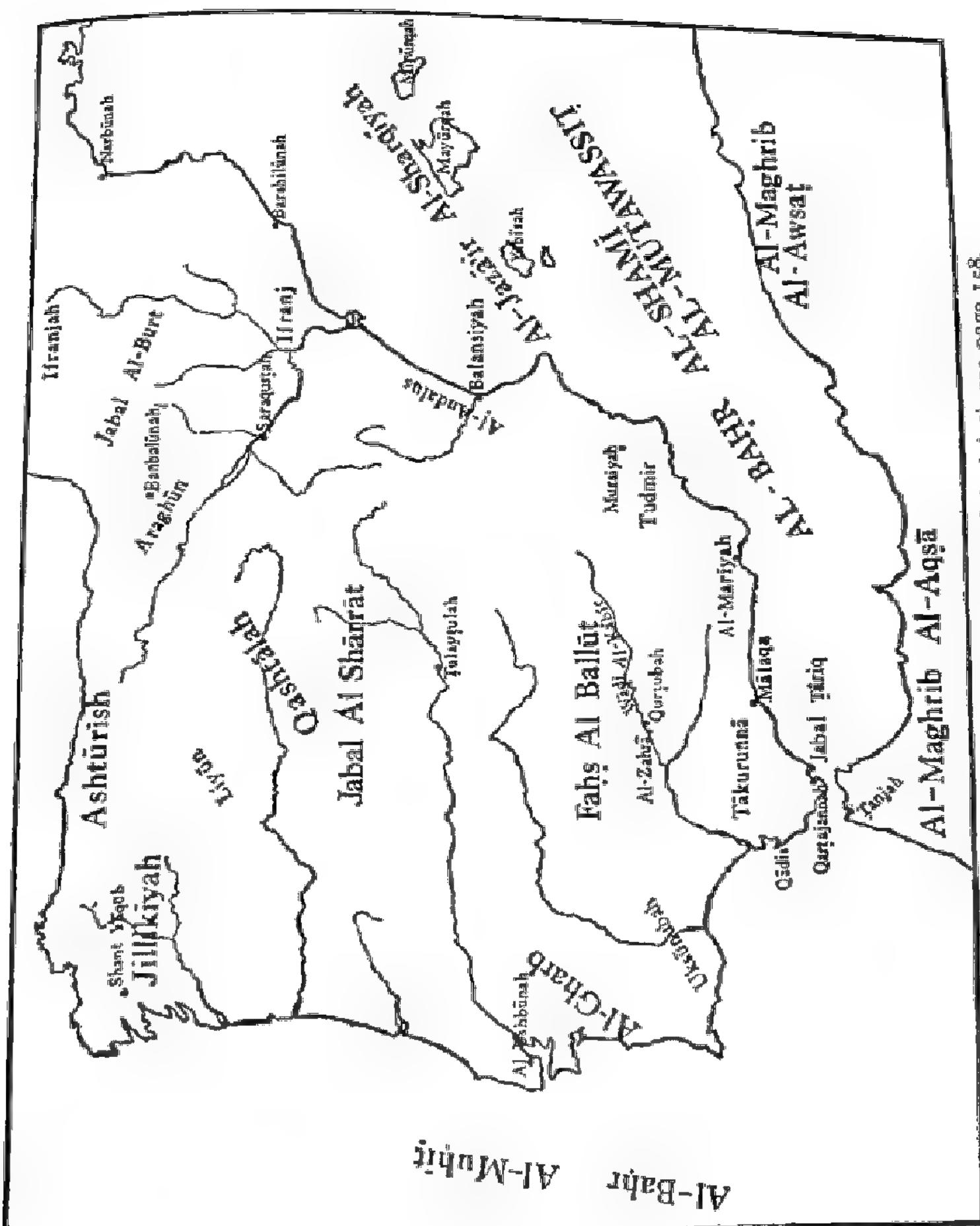


Fig. 2 The Iberian Peninsula (Jazirat al-Andalus), see page 158.

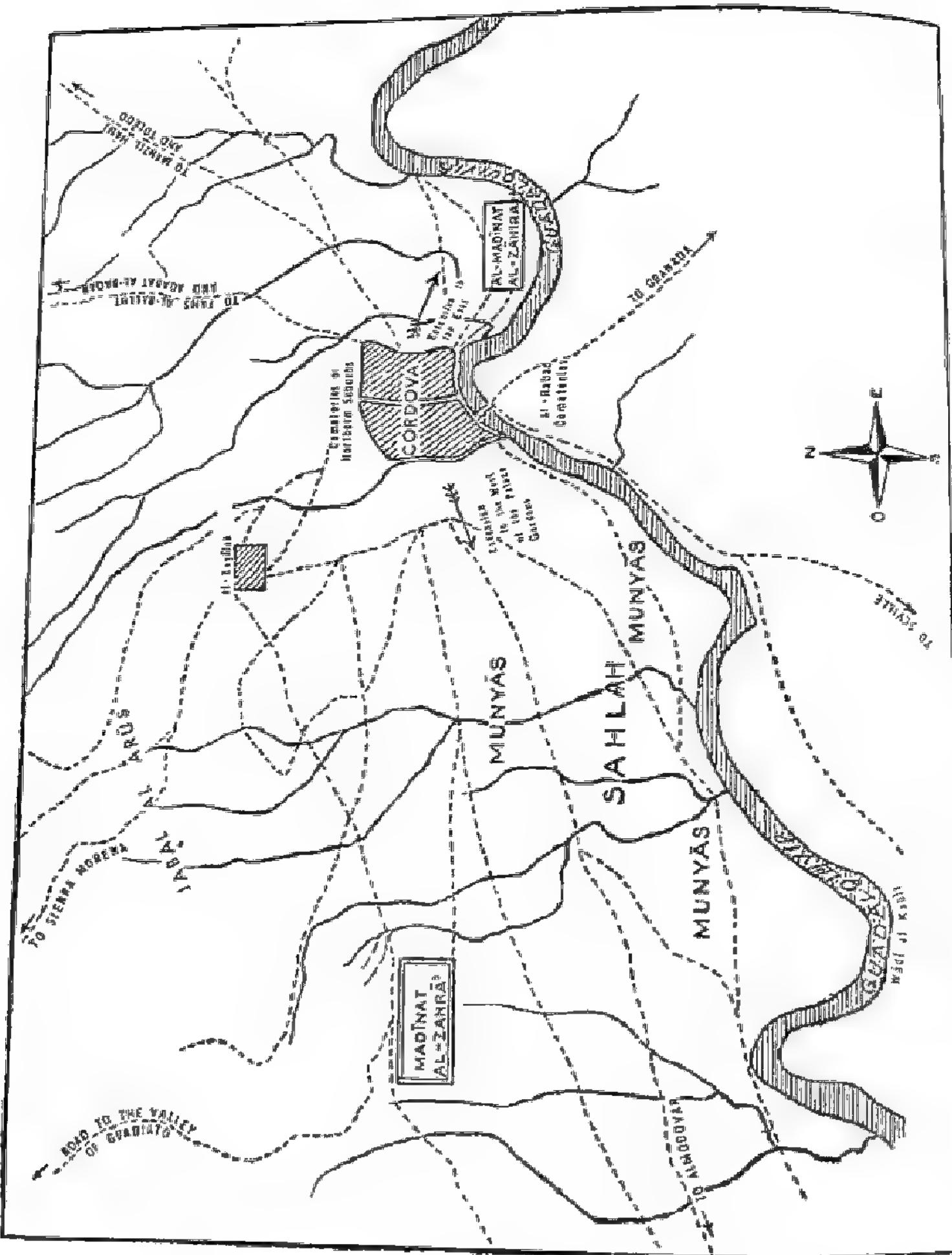


FIG. 4. Suburban development during al-Zahra's lifetime. (See Pl. IV.)

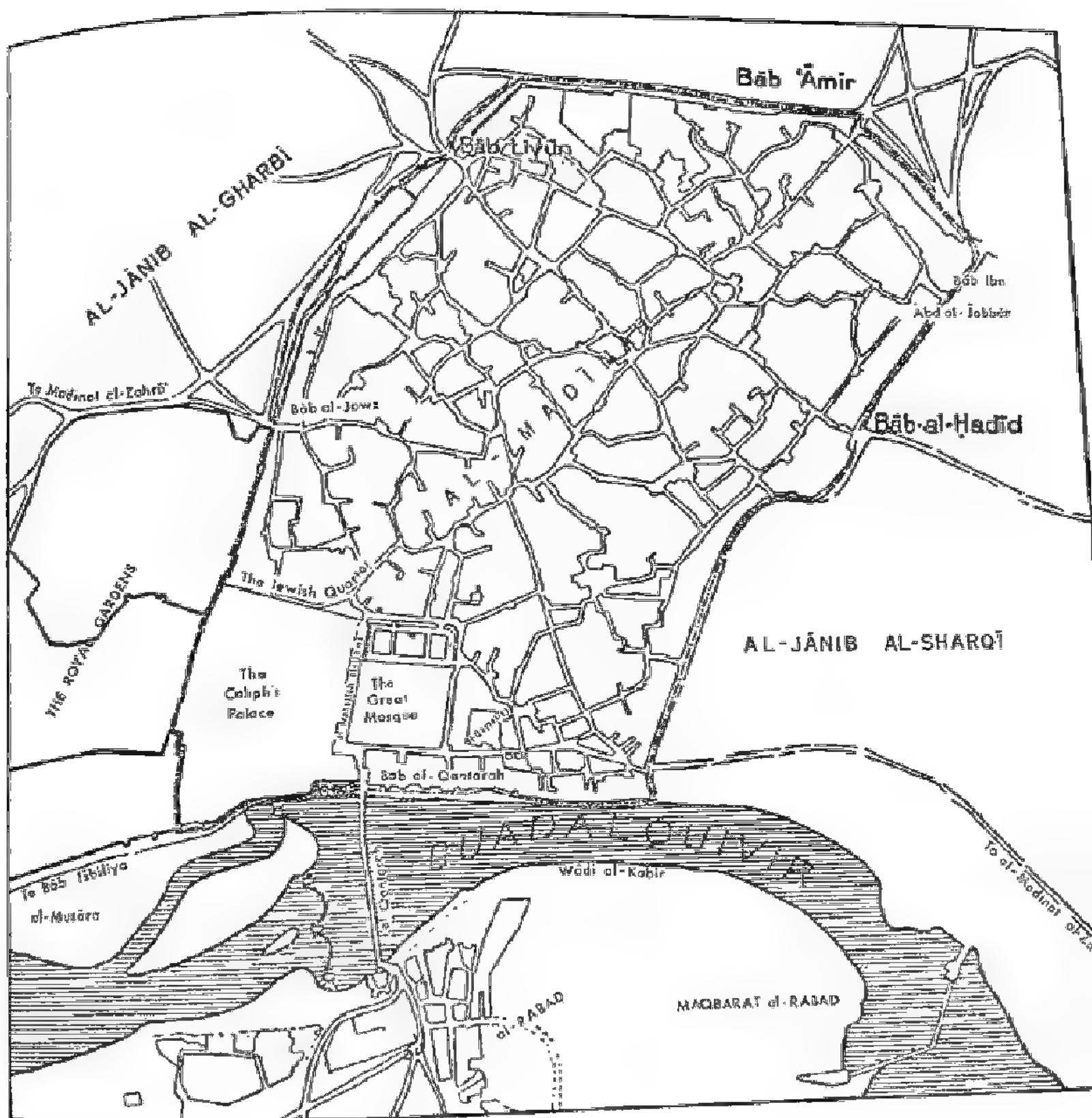


Fig. 3. Cordova in the Tenth Century. (See p. 158)

INCIPIT LIBER SERVITORIS LIBER
xxviii. Bulchasi Benaberazerin tralatus a Si-
mone Januensi interprete Abraai iudeo tortuosiensi.

1146/6.

Ixit aggregator huius operis:
Postq; ego collegi librum hunc
magnum i medicis cōpositis: q; ē
liber magni iuuamenti: quem
nominavi librum servitorem.
& compleui libros suos omnes

secundum uoluntatem meam: inueni in multis
medicis compositis libri huius medicinas multas
simplices que indigent preparatione ante horam
necessitatis magne earum: quemadmodū succos
exprimere: & medicinas cōbutere ablueret & cōficeret
aliquas ex eis. Et discernere que ex eis bona sunt:
et que non bona. & alia secundum hanc formam.
Preuidi igitur aggregare omne quod ē necessarium
in hoc: secundum rememorationem meam. Et
ordinauit hunc librum in tres tractatus.

Primus cogit de preparatiōe lapidū & mineraliū so-
lū: & de ablutiōe cori: & de adustiōe & cōfectione
eorum sicut est marchasita & atramentum &
calcantum & colcotar & species aluminiū & spēs
salis & plūbū & ferri & es & cohol & scoria argéti
& scoria auti: & ē de ablutiōe thucie & calcis: & ē de
sublimatione argéti uiui & arsenici: & de medicis

Fig. 6 Incipit "Liber Servitoris". (See p. 159)

Albucasis.



Fig. 5. Fifteenth-Century Depiction of al-Zahrāwī. (See p. 159)

هـ ٥٥ مـ صـ حـ سـ اـ رـ لـ



هـنـ الصـارـوـيـكـونـ فـيـمـاـغـلـظـتـ تـلـيـلـاـ لـلـاـ تـلـكـسـ عـنـ جـلـبـ
لـجـنـسـهـاـ صـورـ زـاتـ الشـرـكـيـنـ ٥٥٥



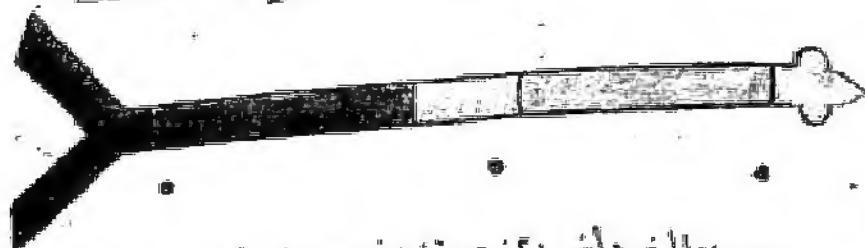
صـورـةـ مـيـضـعـيـنـ عـرـيـضـيـنـ لـقـطـعـ الـجـيـنـ



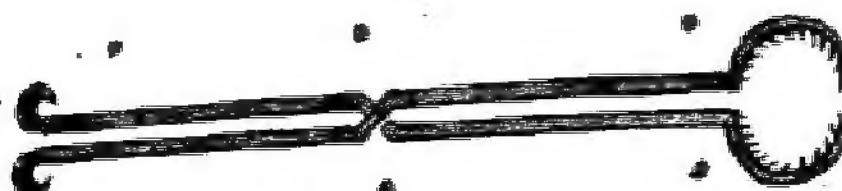
صـورـةـ مـيـضـعـيـنـ وـطـرـفـيـنـ الـذـيـنـ يـقـطـعـ بـهـ لـجـنـسـ
أـنـ شـاءـ اللـهـ تـحـالـ

Fig. 11. Obstetrical Instruments Illustrated in *al-Tasrif*. (See p. 160)

وَاللَّهُ أَعْلَمُ بِالصَّوَابِ



صُورَةُ الْمِشَدَّاخِ الَّذِي تُدْخَلُ بِهِ رَأْسَ الْجَنِينِ إِذَا نَادَ لِلْمَدْعَى



شَبَّهُ الْمَقْرَلُهُ أَسْنَانَ كَثِيرٍ كَثِيرٍ تَنْتَفِعُ مِنْ طَلَّهٖ
كَالْكَلَابِيدَ عَلَى هَذِهِ الصُّورَةِ كَمَا تَرَى لَهَا أَسْنَانٌ كَاسْنَانِ
الْمَثَارِ تَقْطَعُ فِيهَا وَتَرْعَى إِذَا نَادَهُ شَفَاعَهُ شَفَاعَهُ



هَذِهِ صُورَةُ مِنْ دِفْعِ الْيَطَافِ هَذِهِ هَذِهِ

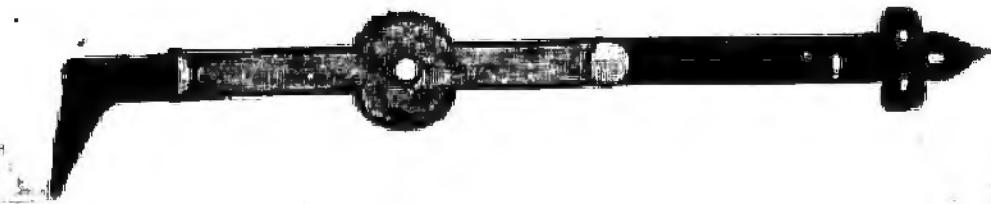


Fig. 12. Obstetrical Instruments Illustrated in *al-Tasrif*. (See p. 160)

فما يدخل المرأة على نسوان مدحلاً بخطيبها من فرجها ما بين
 ساقيهما ثم أدخلهن الأذليتين مسمى ميتن فما التحرر وأن
 ما يدخل طرقاً لا إله أسلل فدريها ثرا فتح يدرك به لاملاً كما
 تفعل بالكلابيب سواعداً تدركه تريل ففتح فتح الرجروجية
 يفتح القابلة ما شرط أن شاء للستيالي وتنفس صفة
 لوكب آخر تذكر أنه ثلاؤ أيام تدفع به للجنين

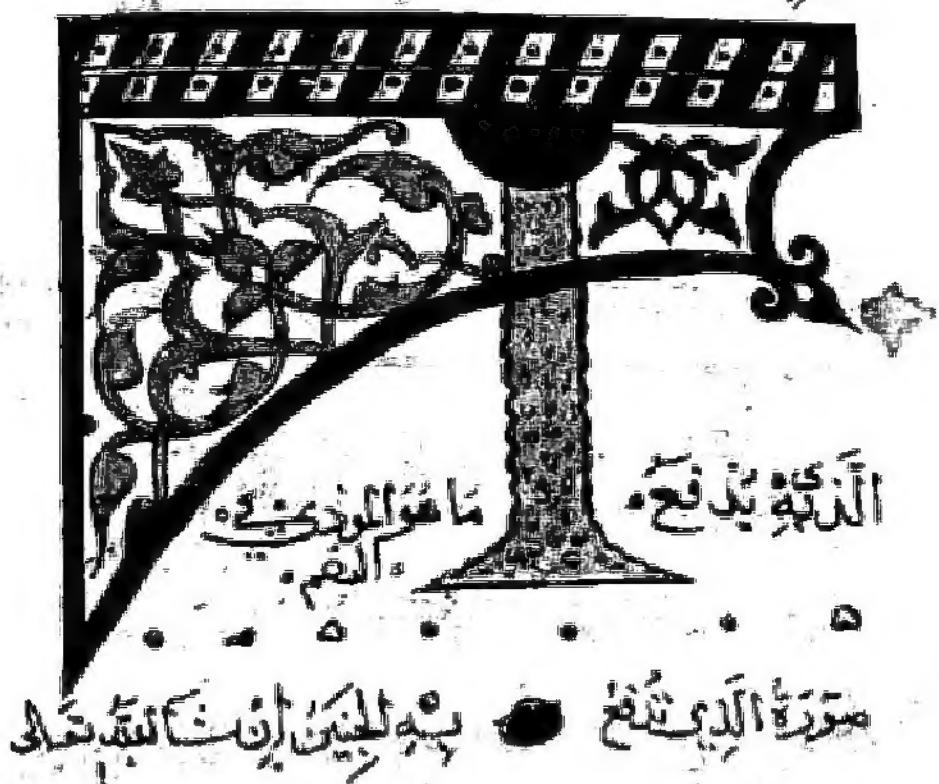
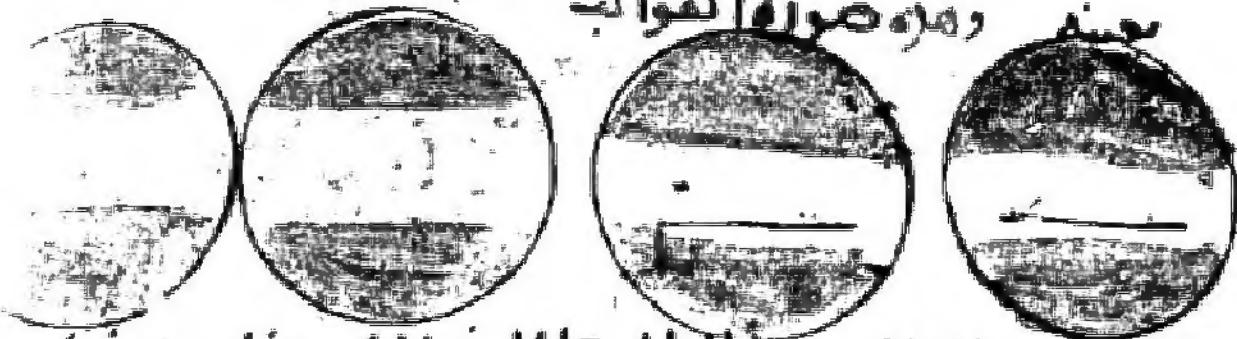


Fig. 13. Obstetrical Instrument Illustrated in *al-Tasrif*. (See p. 160)

صحت فالآخر حضر اعلمه الصفة بصع من القسر
وارسلت صحت فالآخر حضر اعلمه الصفة بصع من القسر
ارسلت حضر اعلمه الصفة بصع من القسر
ارسلت حضر اعلمه الصفة بصع من القسر
ارسلت حضر اعلمه الصفة بصع من القسر
ارسلت حضر اعلمه الصفة بصع من القسر

سیده دهه صدیق العوالب



لہر دی
کان ارڈنے کا

Fig. 14a. Moulds for Tablets. (See p. 160)

نسلاً وسركه حونمگر و سرع الاکلال صعنه علی عربال نم
 نیز در مک علیه حونیزل جمیعه منزه العمال و سوادستاچه رخنیه
 مردو و ما ذره و سمله کاخک دعل هزار الما ل تبر الصوع کاهه
 سرال بگشیه وا خدا شر وا خلیث وال معل وال عروت وال آشور و ما
 اسیده همه صعنه عکل العمالب الری صنع نیه الا فراصر
 با خد لوحه من یقینا و ابیوسرا و خیر مرا خدا المزار عاجا اوینای عود
 شیث تکور صلدا المسرکور طوله ملار اصاع و طوله شبور علطفه
 اصغار بخرو غدر مقا احتنام شر علی صعور علی طوله تکور کخل علطف
 لوح هنیا اصبعا م سعیه الو و هنر جمیع نایعا بط دوابر عکل فرار
 الفعر و هنده و ما زیده م ر علطفه و رفته م کفر لے کل و ده فدار
 علطف بصد الورص و سقیره قیعاده الو و هنر ایم الورص الدک
 نیزدار صعنه اما و رد او اما سعیه او عربها و مکور العر معلو ما
 لیما لی علی طبع العهر مستینیها و ارست ارلا سعیه کل حمره ایم
 الورص علی امداد لطعم لے قالب راهرا و اهرا حمله کمیره م ر علواصر
 فاذا الرطعم فه دهست المهمان دهستا کل للکد الا فراصر رکات
 ا فراصر و زد دهسته بر هنر و زدا و سعیه دهسته بر هنر سعیه بر طبعه
 نهانه شاعه و هده صوره العوال

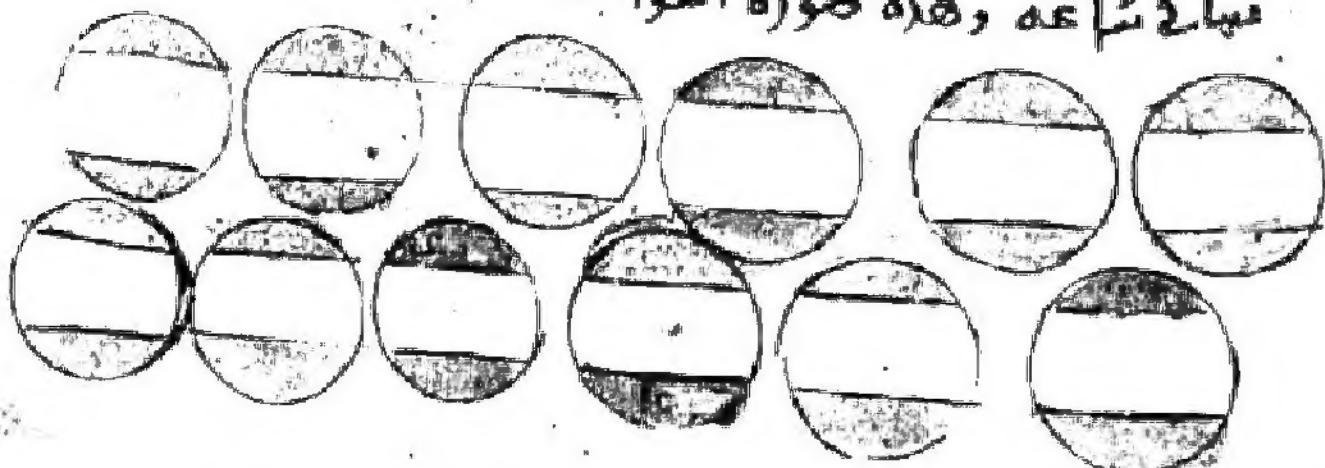


Fig. 14b. Moulds for Tablets. (See p. 160)